Symmetra PX with MBwD

250–500 kW 400/480 V

Installation

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IMPORTANT SAFETY INSTRUCTIONS – SAVE THESE INSTRUCTIONS

WARNING: ALL safety instructions in the Safety Sheet (990-2984) must be read, understood and followed when installing the UPS system. Failure to do so could result in equipment damage, serious injury, or death.

Caution: All electrical power and power control wiring must be installed by a qualified electrician, and must comply with local and national regulations.

This unit contains components that are sensitive to electrostatic discharge (ESD). Follow proper ESD procedures to avoid severe damage to electronic components.

Symbols used

WARNING: Indicates an electrical hazard, which, if not avoided, could result in injury or death.

Caution: Indicates a hazard, which, if not avoided, could result in injury or death.

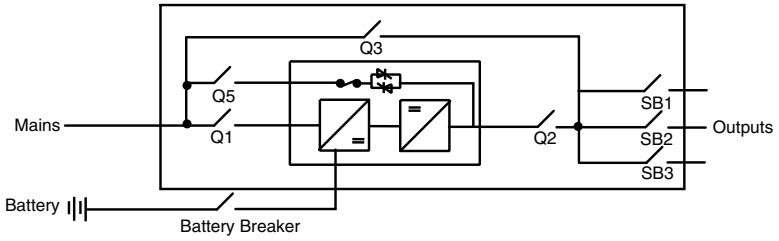
Note: Indicates important information.

See: Indicates that more information is available on this subject.

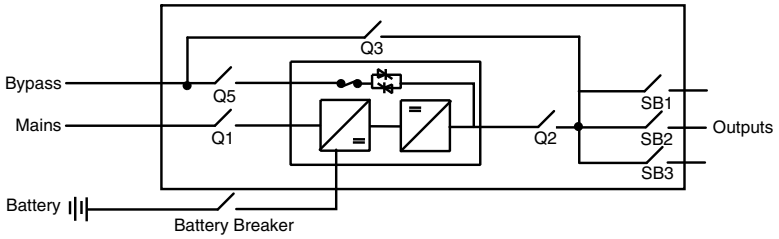
Specifications

Single Configurations

Single Mains with MBwD



Dual Mains with MBwD



AC Mains Input

	250 kW				500 kW			
	380 V[1]	**400 V**	**415 V**	**480 V**	**380 V**[1]	**400 V**	**415 V**	**480 V**
Voltage range	+/-15% for full performance (340 - 460V at 400V, 408 - 552V at 480V) -50% for reduced load (200V at 400V, 240V at 480V)							
Input frequency	40–70 with 10 Hz/sec slewrate							
I thd	< 5% at full load							
Nom input current (A)[2]	398	378	364	315	795	756	728	630
Max input current (A)[3]	437	416	401	346	875	831	801	693
Input current limitation (A)[4]	447	447	431	372	894	894	861	745
Max. input short-circuit level	65 kA/3 cycles (50 kA with standard MBwD)							
Input power factor correction	0.995 @ load = 100 % 0.99 @ load > 50 % 0.97 @ load > 25 %							

[1] 380 V has reduced mains input voltage window (-10% at 100% load).
[2] Input current based on rated load and batteries fully charged.
[3] Input current based in fully battery recharge, nominal voltage and rated load.
[4] Current limitation through electronic current limiting is based on fully recharge and -15% input voltage.

AC Bypass Input

	250 kW				500 kW			
	380 V	**400 V**	**415 V**	**480 V**	**380 V**	**400 V**	**415 V**	**480 V**
Input frequency (Hz)	50/60							
Nom input current (A)	380	361	348	301	760	722	696	601

AC Output

	250 kW				500 kW			
	380 V	**400 V**	**415 V**	**480 V**	**380 V**	**400 V**	**415 V**	**480 V**
Output capacity	150% for 30 seconds (normal operation) 125% for 10 minutes (normal operation) 150% for 30 seconds (battery operation) 125% for 10 minutes (battery operation) 125% Continuous at 480 V/110% Continuous at 400 V (bypass operation)[1] 1000% for 100 ms (bypass operation)							
Voltage tolerance	Sym. load (0-100%): +/-1% static, +/-5% after 2 ms and +/-1% after 50 ms dynamic Asym. load (0-100%): +/-3% static							
Nom output current (A)	380	361	348	301	760	722	696	601
Output frequency (sync to mains)	50 Hz/60 Hz							
Slew rate (Hz/Sec)	0.25 - 6							
Total Harmonic Distortion (THD)	< 2% linear load < 3% non-linear load							
Output power factor	1							
Dynamic load response	+/- 5%							
[1] This is a UPS thermal performance rating. The continuous overload is not supported by the recommended input protection in this document.								

Battery Input

	250 kW	500 kW
Nom. voltage	2 x +/- 288 Vdc	
I_{Nom} discharge[1]	452	904
I_{Max} discharge[2]	565	1130
End Voltage	1.6–1.75/cell (automatic, depending on load)	
[1] Nominal battery discharge current based on rated load and nominal battery voltage [2] Maximum battery discharge current based on rated load at the end of the discharge [3] Maximum available fault current: 40 kA		

The UPS supports customer-specific battery solutions with 144 cells +/- 6 cells (138 - 150 cells) for runtime optimization. Display settings allow programmable settings for number of cells and all DC voltage levels where voltage is typed in as V/cell.

	Adjustable window
Battery type	Sealed lead acid/wet cells
Nom voltage (Vdc)	+/- 276 — +/- 300
Float voltage (Vdc)	+/- 308 — +/- 345
Boost charge voltage (Vdc)	+/- 308 — +/- 345
Equalize charge voltage	+/- 308 — +/- 345
End of discharge voltage at full load (Vdc)	+/- 221 — +/- 263
Charging power	20 % of nominal power at 0–90 % load 10 % of nominal power at 100 % load
Typical recharge time	3.5 hours

Fuses, Breakers, and Cables in the US

Single Systems

In single utility/mains systems, supply the UPS from a grounded 4–wire WYE service.

In dual utility/mains systems, use a 4–wire supply for the bypass and a 3–wire supply for the mains input.

APC also supports 3–wire installations if the utility transformer is a grounded WYE transformer located in the same room. In this installation, the UPS system must be installed as a separately derived system. Please refer to section ***"Connection of Bonding Jumper and Technical/System Earth"***. Leakage currents will occur in the bonding jumper and the technical/system earth.

Caution: 3–wire installation using bonding wire will result in a higher leakage current. Leakage current for typical installation are usually within UL and industry standard limits.

Recommended Fuses, Breakers, and Cable Sizes

Caution: All wiring must comply with all applicable national and/or local electrical codes.

Temperature rating of conductors: 90°C/194°F. Refer to table 310-16 of NEC, 75°C column for maximum ampacity. Use only copper conductors.

Equipment grounding conductors are sized in accordance with NEC Article 250-122 and Table 250-122.

The cable sizes are recommendations for maximum configurations with three current carrying conductors. For other configurations see the label inside the front door of the Input/Output/Bypass Enclosure.

Note: A separate 800 A protection device for bypass input (similar to dual mains) is required for single mains systems from 450 kW 400 V or 475 kW 415 V.

Installations with 100% Rated Circuit Breakers or Fuses[2]

	250 kW						500 kW					
	400 V		415 V		480 V		400 V		415 V		480 V	
	OCPD	Cable	OCPD	Cable	OCPD	Cable	OCPD	Cable	OCPD	Cable	OCPD	Cable
Mains input Q1	450A	2x4/0	450A	2x4/0	400A	1x500	1000A	3x400	1000A	3x400	800A	2x500
Bypass input Q5[1]	400A	2x2/0	350A	2x2/0	350A	2x2/0	800A	3x250	700A	3x250	700A	3x4/0
Battery	500A	2x4/0	500A	2x4/0	500A	2x4/0	1000A	3x400	1000A	3x400	1000A	3x400
AC output Q2	400A	1x500	350A	1x500	350A	1x350	800A	2x500	700A	2x500	700A	2x350

[1] Max. input protection: 800 A and the maximum cable size is 250 kcmil
[2] Use breaker or class J or class L fuses.
Appropriate disconnect devices shall be provided external to the equipment.

Installations with 80% Rated Circuit Breakers

	250 kW						500 kW					
	400 V		415 V		480 V		400 V		415 V		480 V	
	OCPD	Cable	OCPD	Cable	OCPD	Cable	OCPD	Cable	OCPD	Cable	OCPD	Cable
Mains input Q1	600A	2x300	600A	2x250	450A	2x4/0	Not allowed		Not allowed		1000A	3x400
Bypass input Q5[1]	500A	2x4/0	450A	2x4/0	400A	2x3/0	Not allowed		Not allowed		800A	3x250
Battery	500A	2x4/0	500A	2x4/0	500A	2x4/0	1000A	3x400	1000A	3x400	1000A	3x400
AC output Q2	500A	2x4/0	450A	2x4/0	400A	1x500	Not allowed		Not allowed		800A	2x500

[1] Max. input protection is 800 A and the maximum cable size is 250 kcmil.
Appropriate disconnect devices shall be provided external to the equipment.

Recommended Bolt and Lug Sizes

Cable size	Terminal bolt diameter	Single Hole lug	NEMA 2 Lug	Crimping tool/die
4/0 AWG	M10	LCA 4/0-12-X	LCD 4/0-12-X	CT-720/CD-720-3
250 kcmil	M10	LCA250-12-X	LCD250-12-X	CT-720/CD-720-3
300 kcmil	M10	LCA300-12-X	LCD300-12-X	CT-720/CD-720-4
350 kcmil	M10	LCA350-12-X	LCD350-12-X	CT-720/CD-720-5
400 kcmil	M10	LCA400-12-6	LCD400-12-6	CT-720/CD-720-6
500 kcmil	M10	LCA500-12-6	LCD500-12-6	CT-720/CD-720-7

Fuses, Breakers, and Cables in Europe, Africa, and Asia

Supply the UPS from a 5–wire TN-S system (L1, L2, L3, N, PE).

The recommended cable sizes are based on an environment with an ambient temperature of 40°C (104°F).

Temperature ratings of conductors: 90°C (194°F).

Refer to IEC 60364-5-52 for installation methods. The cable sizes are recommendations for maximum configurations and copper cables. For other system size configurations see label inside of Input/Output/Bypass front door.

Recommended Cable Sizes in Systems with Breaker Protection[1]

Installation Method	**OCPD**	**B1** (mm^2)	**B2** (mm^2)	**C** (mm^2)	**OCPD**	**B1** (mm^2)	**B2** (mm^2)	**C** (mm^2)
	400 V				**415 V**			
	250 kW							
Mains input	400A[1]	2 x 95	2 x 120	2 x 95	400A[1]	2 x 95	2 x 120	2 x 95
Bypass input	400A	2 x 95	2 x 120	2 x 95	355A	2 x 95	2 x 120	2 x 95
Battery	500A	1 x 120	3 x 95	2 x 95	500A	1 x 120	3 x 95	2 x 95
Output	400A	2 x 95	2 x 120	2 x 95	355A	2 x 95	2 x 120	2 x 95
	500 kW							
Mains input	800A	4 x 120	-	3 x 150	800A[1]	4 x 120	-	3 x 150
Bypass input	800A	4 x 120	-	3 x 150	800A	4 x 120	-	3 x 150
Battery	1000A	-	-	3 x 240	1000A	-	-	3 x 240
Output	800A	4 x 120	-	3 x 150	800A	4 x 120	-	3 x 150

[1] Breaker must comply with IEC 60947-2 which garantee a non-tripping current of 1,05 times current setting for 2 hours. Alternative breaker size must be higher than stated current.
Appropriate disconnect devices shall be provided external to the equipment.

Recommended Cable Sizes in Systems with Fuse Protection

Installation Method	OCPD	B1 (mm^2)	B2 (mm^2)	C (mm^2)	OCPD	B1 (mm^2)	B2 (mm^2)	C (mm^2)
	400 V				415 V			
	250 kW							
Mains input	500A	2 x 95	2 x 120	2 x 150	400A[1]	2 x 95	2 x 120	2 x 95
Bypass input	400A	2 x 95	2 x 120	2 x 95	355A	2 x 95	2 x 95	1 x 185
Battery	500A	1 x 120	3 x 95	2 x 95	500A	1 x 120	3 x 95	2 x 95
Output	400A	2 x 95	2 x 120	2 x 95	355A	2 x 95	2 x 95	1 x 185
	500 kW							
Mains input	1000A	-	-	4 x 150	1000A	-	-	4 x 150
Bypass input[1]	800A	4 x 120	-	3 x 150	800A	4 x 120	-	3 x 150
Battery	1000A	-	-	3 x 240	1000A	-	-	3 x 240
Output	800A	4 x 120	-	3 x 150	800A	4 x 120	-	3 x 150
[1] Max. input protection: 800 A								

Required Breaker Settings for Input Overload and Short-Circuit Protection for Breakers with Electronic Trip Units

Single Mains Installation (Common Mains and Bypass Input Breaker)

	Mains input breaker
In	= Maximum input current
STPU	In x A (3 < A < 4)
STD	Max. 100 ms
LTD	Max. 3 x In in 5s
Iinst	In x 5

Dual Mains Installation (Separate Mains and Bypass Breaker)

	Mains input breaker	Bypass input breaker
In	= Maximum input current	= Maximum input current
STPU	In x A (3 < A < 4)	In x B (10 < B <12)
STD	Max. 100 ms	Max. 100 ms
LTD	Max. 3 x In in 5s	Max. 3 x In in 5s
Iinst	In x 5	In x 15

Torque Specifications

Bolt size M8	Bolt size M10
13.5 Nm	30 Nm

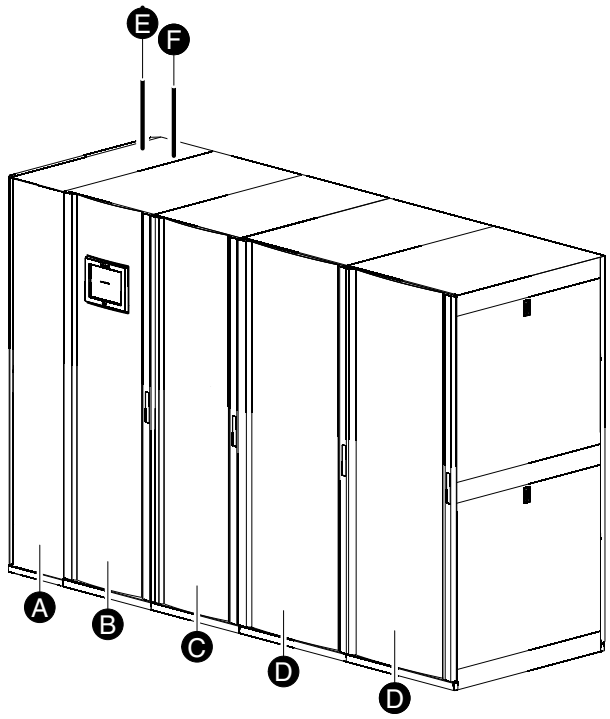
Connect the Power Cables

Overview of Cables

APC recommends to run the output cables out of the top of the Maintenance Bypass Panel with Distribution but it is also possible to run the cables out of the bottom. The running of the output cable does not impact the routing of the mains and bypass cables.

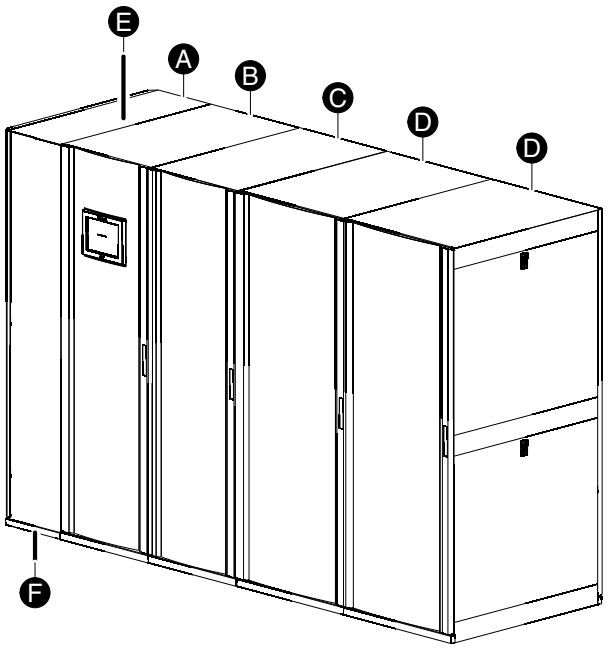
Single Mains

Top Entry Systems with Line-Up and Match Batteries



A. Maintenance Bypass Panel with Distribution (MBwD)
B. Input/Output/Bypass
C. Power Module Enclosure
D. Battery Enclosure
E. Output Cables
F. Input Cables

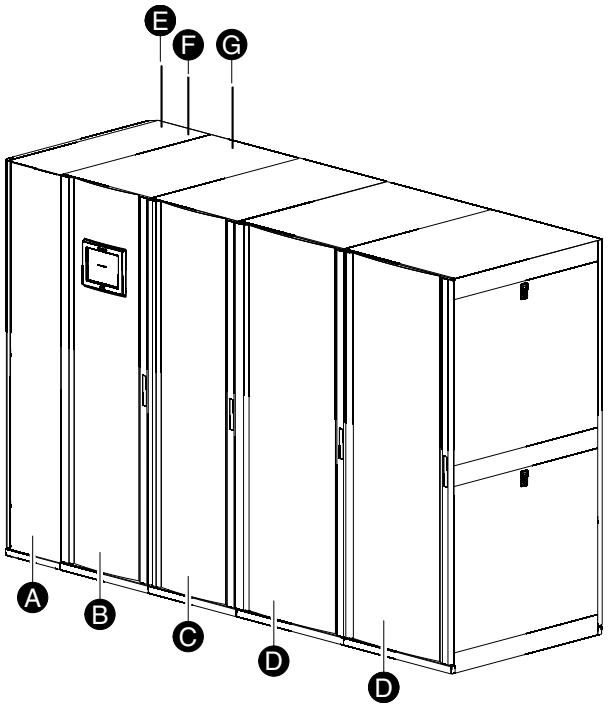
Bottom Entry Systems with Line-Up and Match Batteries



A. Maintenance Bypass Panel with Distribution (MBwD)
B. Input/Output/Bypass
C. Power Module Enclosure
D. Battery Enclosure
E. Output Cables
F. Input Cables

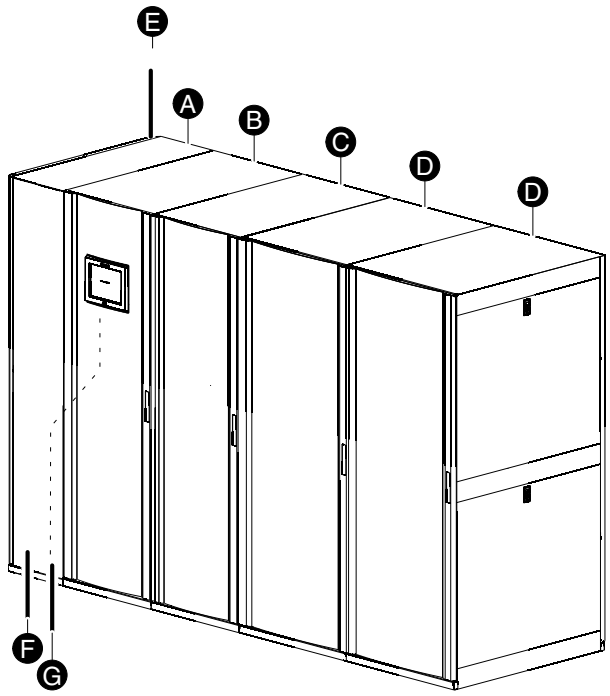
Dual Mains

Top Entry Systems with Line-up and Match Batteries



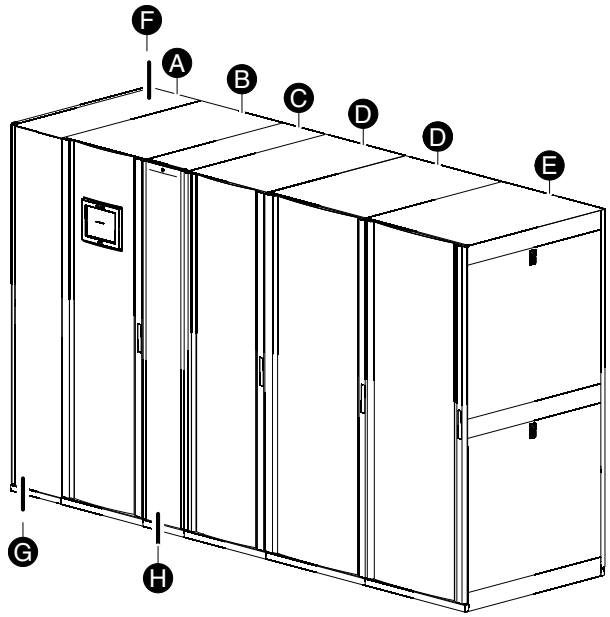
A. Maintenance Bypass with Distribution (MBwD)
B. Input/Output/Bypass
C. Power Module Enclosure
D. Battery Enclosure
E. Bypass Input Cables
F. Output Cables
G. Mains Input Cables

Bottom Entry Systems <250 kW with Line-up and Match Batteries



A. Maintenance Bypass with Distribution (MBwD)
B. Input/Output/Bypass
C. Power Module Enclosure
D. Battery Enclosure
E. Output Cables
F. Bypass Input Cables
G. Mains Input Cables

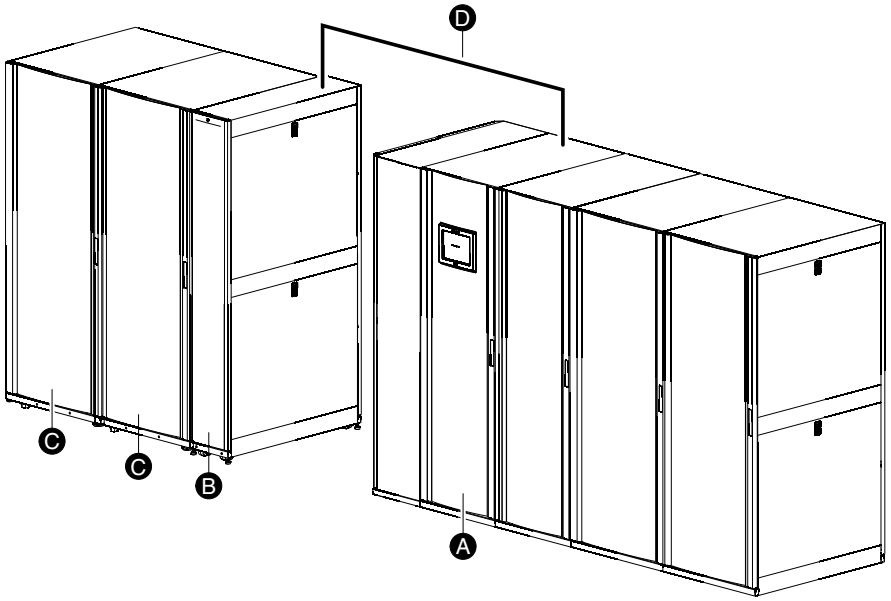
Bottom Entry Systems >250 kW with Line-up and Match Batteries



A. Maintenance Bypass with Distribution (MBwD)
B. Input/Output/Bypass
C. Bottom Feed Enclosure
D. Power Module Enclosure
E. Battery Enclosure
F. Output Cables
G. Bypass Input Cables
H. Mains Input Cables

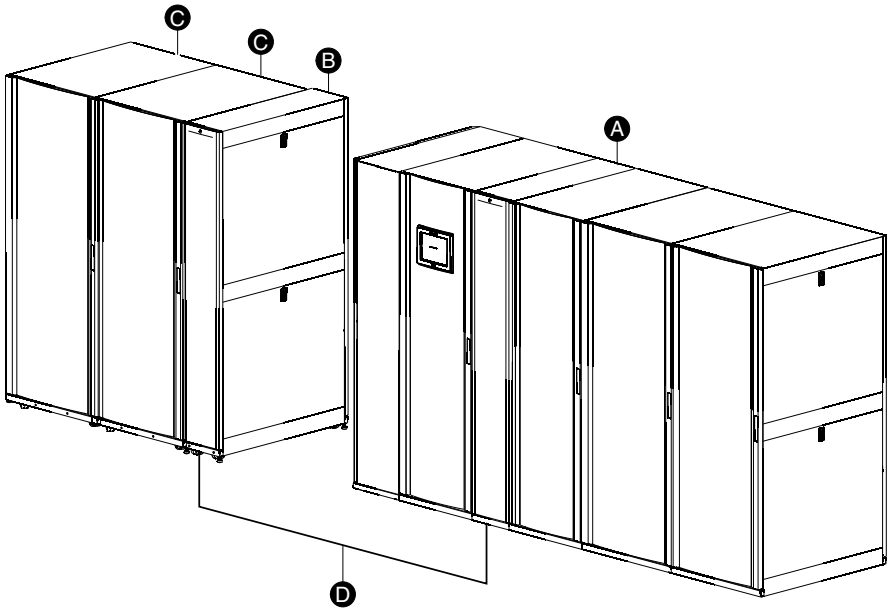
Remote Batteries

Top Cable Entry



A. Input/Output/Bypass
B. Battery Side Car
C. Battery Enclosure
D. Battery Cables

Bottom Cable Entry



A. Bottom Feed Enclosure
B. Battery Side Car
C. Battery Enclosure
D. Battery Cables

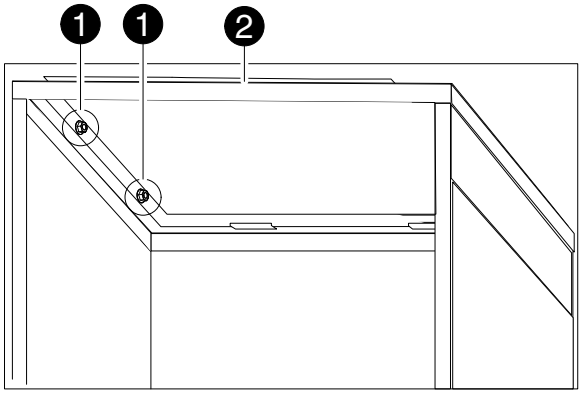
Prepare for cables

Caution: Drilling or cutting must not take place over the top or inside the UPS.

Top Cable Entry

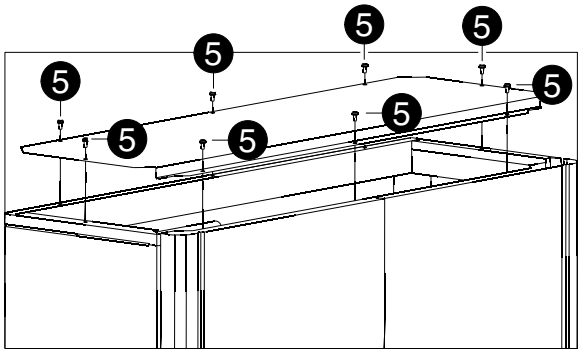
1. From the inside of the Input/Output/Bypass Enclosure, loosen the four screws.
2. Lift up the front of top cover and slide it out.
3. Drill/punch holes for cables.
4. Refit the cover and install conduits (if applicable).
5. Ensure no sharp edges that may damage conductors.

Input/Output/Bypass Enclosure



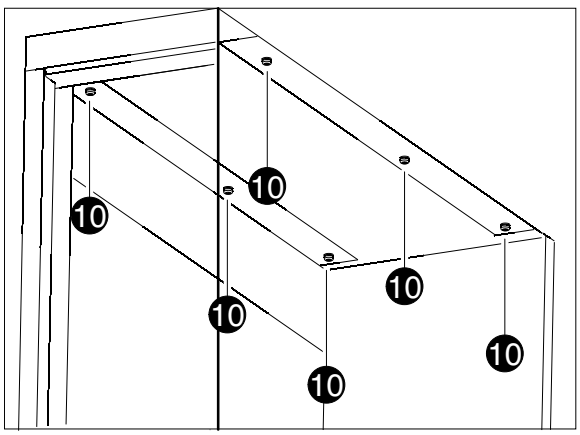
6. Remove the top cover of the MBwD by loosening the eight M5 screws.
7. Drill/punch holes for cables.
8. Refit the cover and install conduits (if applicable).
9. Ensure no sharp edges that may damage conductors.

MBwD



10. From the inside of the Battery Side Car, loosen the six nuts.
11. Lift off the top cover.
12. Drill/punch holes for cables.
13. Refit the cover and install conduits (if applicable).
14. Ensure no sharp edges that may damage conductors.

Battery Side Car

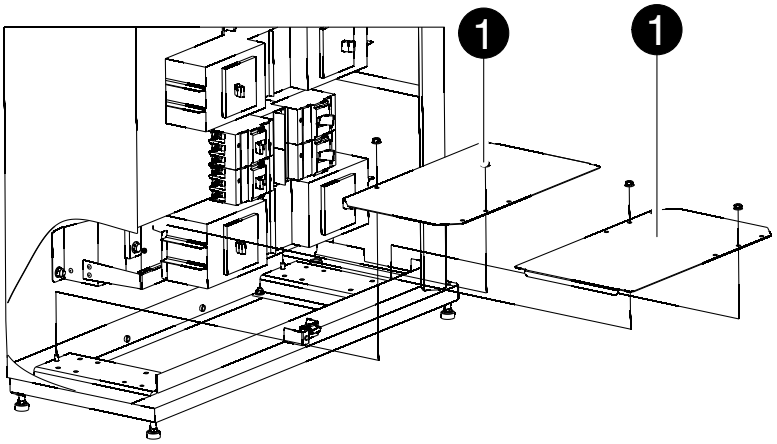


Bottom Cable Entry

Note: After the system has been leveled, the caster assembly can be removed if additional space for cables is needed. Save the caster assembly.

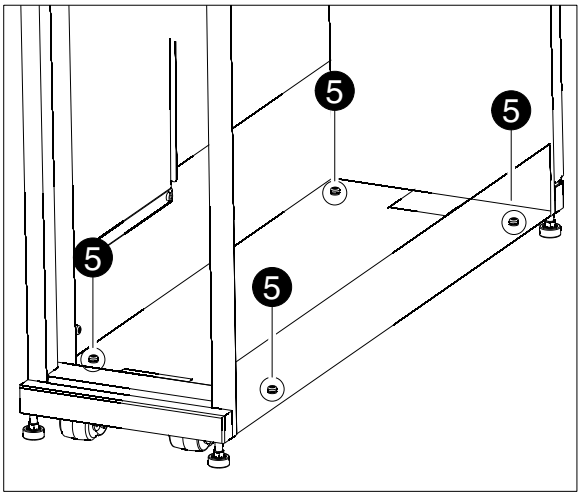
1. Remove the bottom plates by loosening the eight M8 nuts.
2. Drill/punch holes for mains and bypass cables in bottom plate.
3. Refit plate and install conduits (if applicable).
4. Ensure no sharp edges that may damage conductors.

MBwD



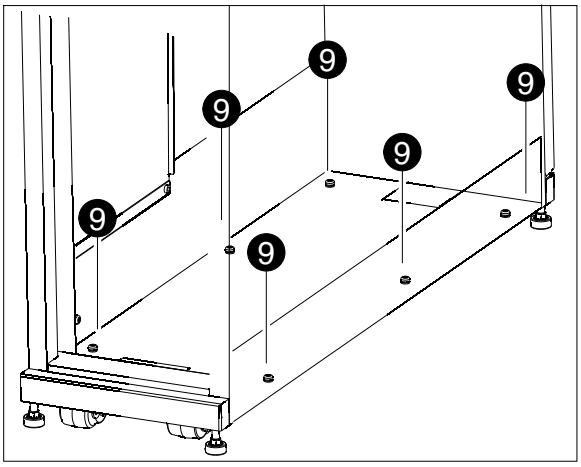
5. Remove the bottom plate by loosening the four M8 bolts.
6. Drill/punch holes for cables.
7. Refit plate and install conduits (if applicable).
8. Ensure no sharp edges that may damage conductors.

Bottom Feed Enclosure



9. Loosen the six bolts and remove the bottom plate.
10. Drill/punch holes for cables.
11. Refit the plate and install conduits (if applicable).
12. Ensure no sharp edges that may damage conductors.

Battery Side Car



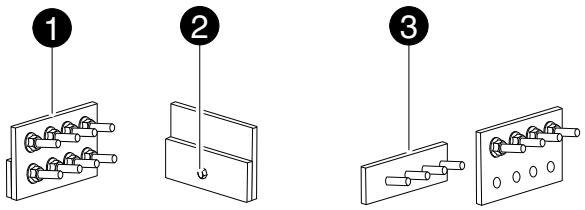
Remove NEMA 2 Hole Pattern

Note: The NEMA 2 hole plates can be installed upside down to gain additional wiring clearances.

The NEMA 2 hole pattern plate is only used in some installations in the US. In other installations, the NEMA 2 plate must be removed.

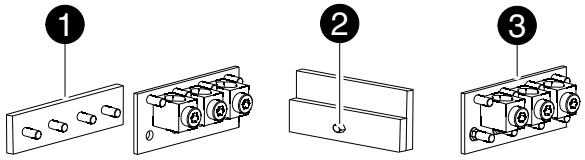
Use cable lugs with a mutual distance of 44.5 mm. In other installations, follow the below procedure to remove the NEMA 2 hole pattern plates from the busbars.

1. Loosen the four 10 mm nuts connecting the NEMA 2 hole pattern plate to the busbar.
2. Loosen the 8 mm nut on the back of the busbar.
3. Slide the NEMA 2 hole pattern plate off the busbar.



Install the Terminal Blocks (Optional)

1. Slide the plate with the terminal blocks onto the busbar.
2. Tighten the 8 mm nut on the back of busbar.
3. Tighten the four 10 mm nuts below the terminal blocks.

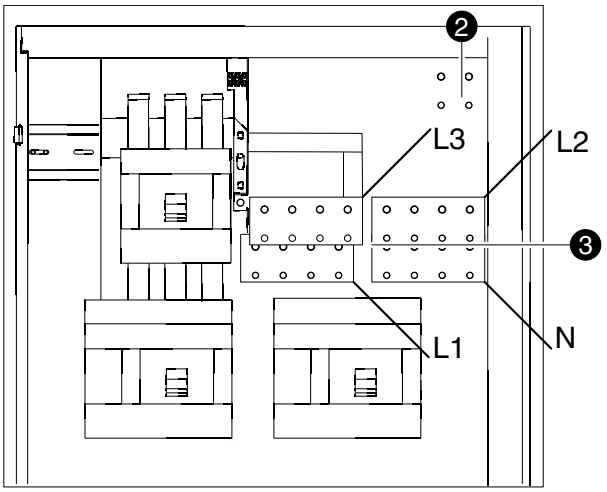


Connect Input Cables, Bypass Cables, and PE/Equipment Grounding Conductor

Single Mains System

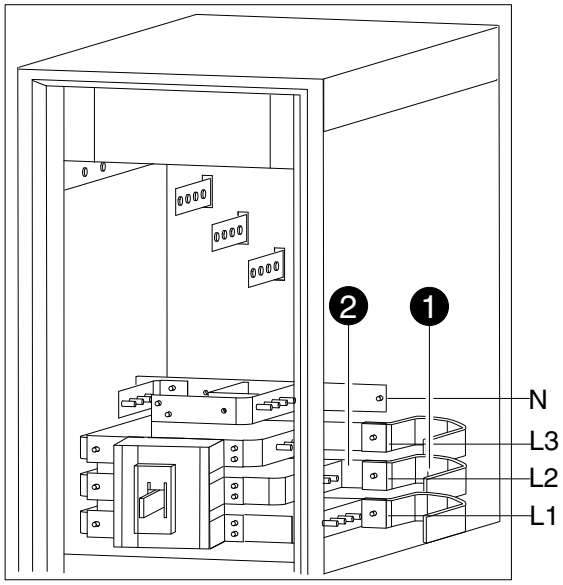
1. Remove the clear shield that covers the busbars.
2. Connect the equipment grounding conductor/PE cable.
3. Connect the AC input cables to the AC Bypass Input cable landings in the MBwD (single feed busbars connect the AC Bypass Input busbars to the AC Mains Input cable busbars). The N-bus is not applicable to 3-wire systems.

MBwD

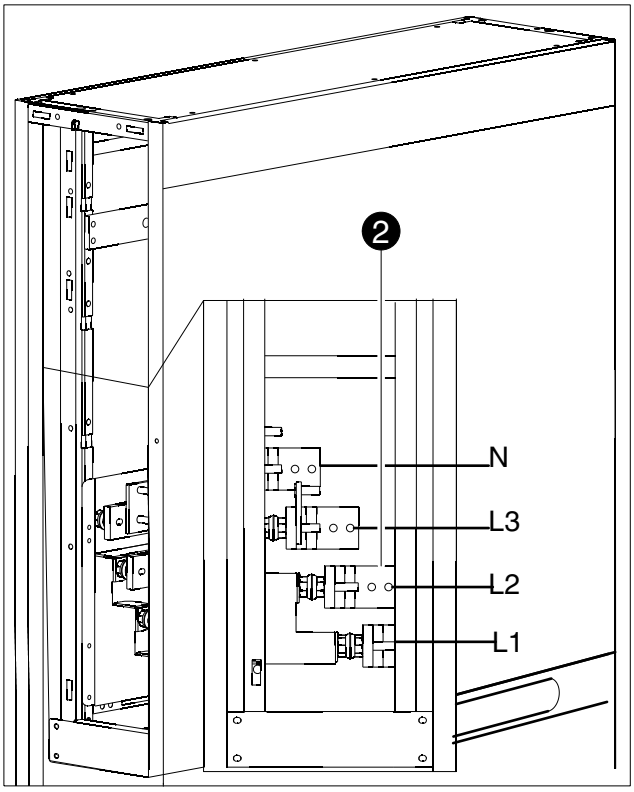


Dual Mains System

250 kW systems: Input/Output/Bypass

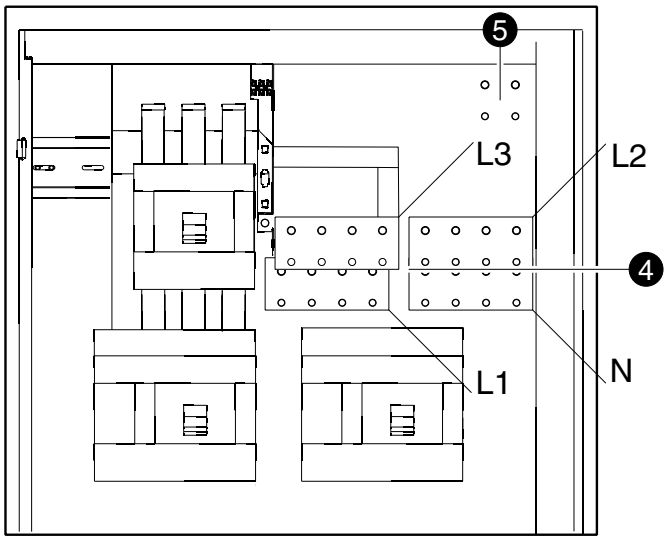


500 kW systems: MBwD



1. Ensure that the single feed busbars, that connect the mains input busbars in the Input/Output/Bypass Enclosure to the bypass input busbars in the MBwD, have been removed.

2. Connect the AC input cables to the AC Mains Input cable landings in the Input/Output/Bypass Enclosure. In systems over 250 kW with bottom cable entry, a Bottom Feed Enclosure is required for mains connection. The N-bus is not applicable to 3-wire systems.
3. Install plastic covers over the terminals L1, L2, L3, N.
4. Connect the AC bypass input cables to the AC Bypass Input cable landings in MBwD. The N-bus is not applicable to 3-wire systems.
5. Connect the grounding conductor/PE cable.



Connection of Bonding Jumper and Technical/System Earth

Connect the bonding jumper and the technical/system earth according to the guidelines below:

Systems in the US

- 4–wire systems
  - Bonding jumper: Not connected
  - Technical/system earth: No Local Grounding Electrode connected
- 3–wire systems
  - Bonding jumper: Must be connected
  - Technical/system earth: A Grounding Electrode must be connected via the Grounding Electrode Conductor

Systems in Europe, Africa, and Asia

- 5–wire systems
  - Bonding jumper: Not connected
  - Technical/system earth: A Local Earth Electrode must be connected

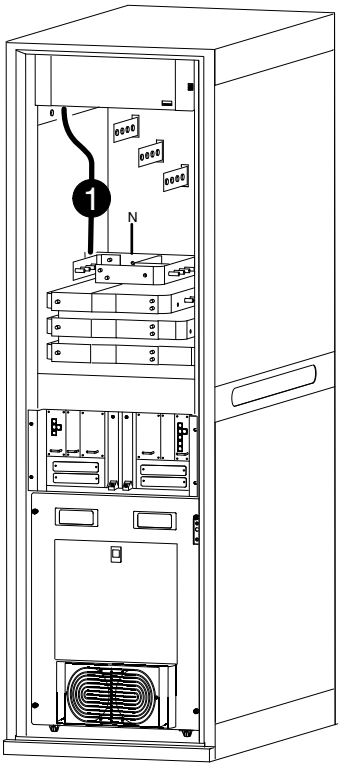
Connect the Bonding Jumper

WARNING: The bonding jumper must be installed in 480 V 3-wire systems. Failure to do so could result in equipment damage.

WARNING: This section is not applicable for 4–wire parallel systems.

1. Take the bonding jumper that is connected to the grounding busbar in the side of the Input/Output/Bypass Enclosure and connect it to the N-point.

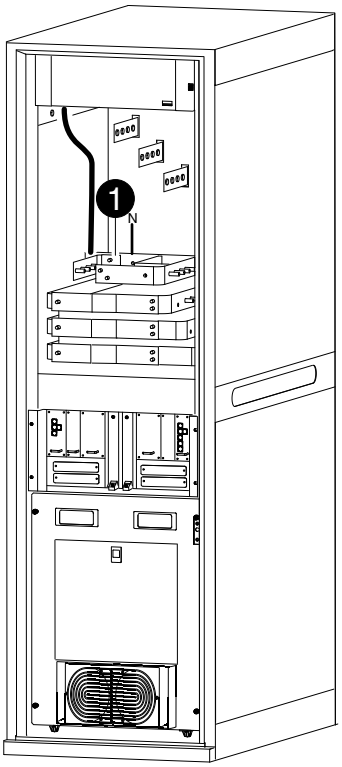
Input/Output/Bypass Enclosure



Connect the Technical Earth

1. Connect the earth electrode to the N busbar in the Input/Output/Bypass Enclosure in the location labeled **Grounding Electrode Terminal – E**.

Input/Output/Bypass Enclosure

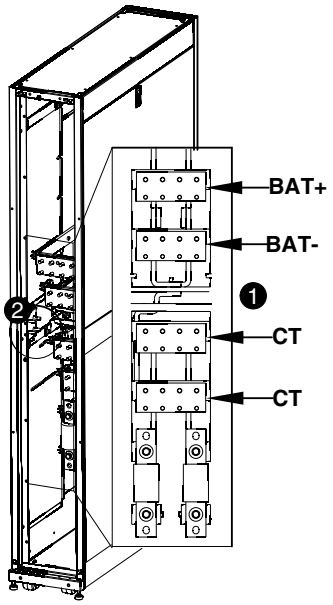


Connect Battery Cables in Systems with Remote Batteries

Connect Battery Cables in Top Cable Entry Systems

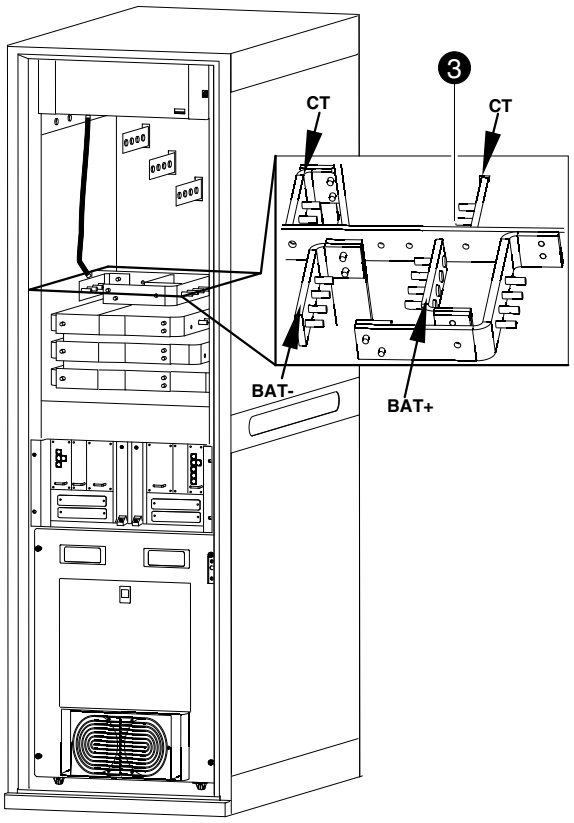
1. Connect one end of the battery cables to the BAT+, BAT-, and CT (Midpoint) cable landings in the Battery Side Car.
2. Connect the ground/PE cable.

Battery Side Car



3. Connect the other end of the battery cables to BAT+, BAT-, and CT (Midpoint) cable landings in the Input/Output/Bypass Enclosure.

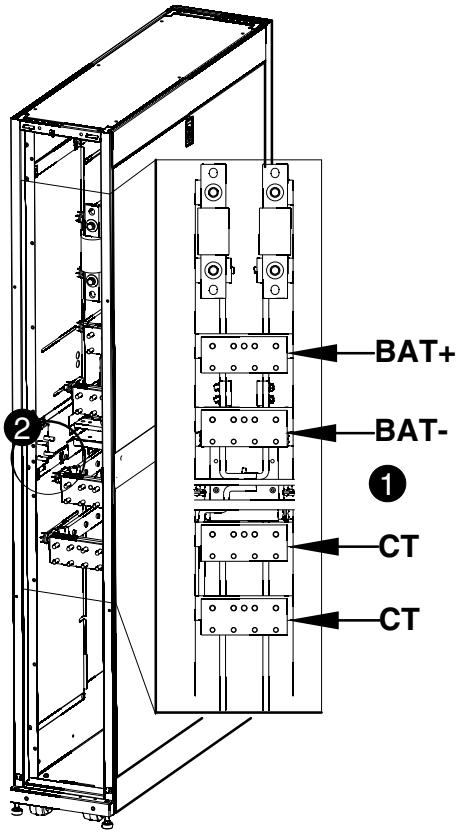
Input/Output/Bypass Enclosure



Connect Battery Cables in Bottom Cable Entry Systems

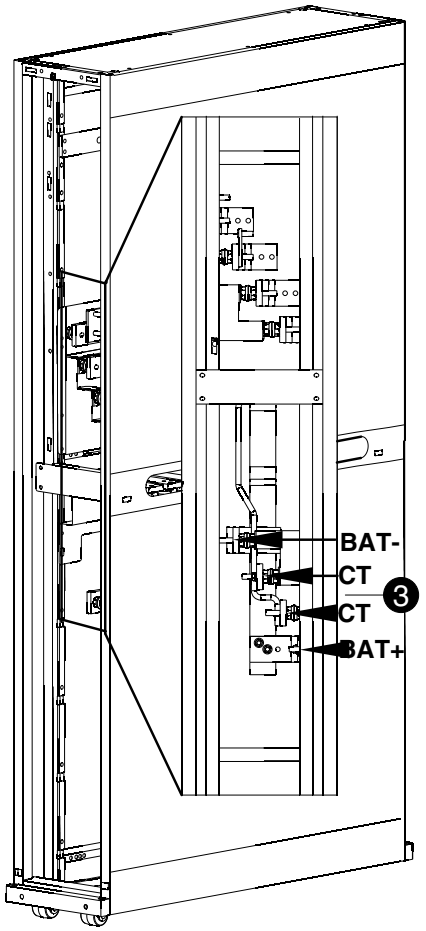
1. Connect one end of the battery cables to the BAT+, BAT-, and CT (Midpoint) cable landings in the Battery Side Car.
2. Connect the ground/PE cable.

Battery Side Car



3. Connect the other end of the battery cables to BAT+, BAT-, and CT (Midpoint) cable landings in the Bottom Feed Enclosure.

Bottom Feed Enclosure



Communication Cables

EPO switch wiring

In installations with EPO, the UPS must be connected to either a dry contact or an external 24 Vdc Emergency Power Off (EPO) switch.

For installations in the US and Canada

The EPO circuit is considered Class 2 and SELV (Safety Extra Low voltage). A SELV circuit is isolated from primary circuitry through an isolating transformer and designed so that under normal conditions, the voltage is limited to 42.4 Vac peak or 60 Vdc. SELV and Class 2 circuits must be isolated from all primary circuitry. Do not connect any circuit to the EPO terminal block unless it can be confirmed that the circuit is SELV or Class 2.

Installations in the US

- CL2 Class 2 cable for general purpose use
- CL2 Plenum cable for use in a vertical shaft or from floor to floor
- CL2 R Racer cable for use in dwellings and raceways
- CL2 XLimited use cable for dwellings and raceways

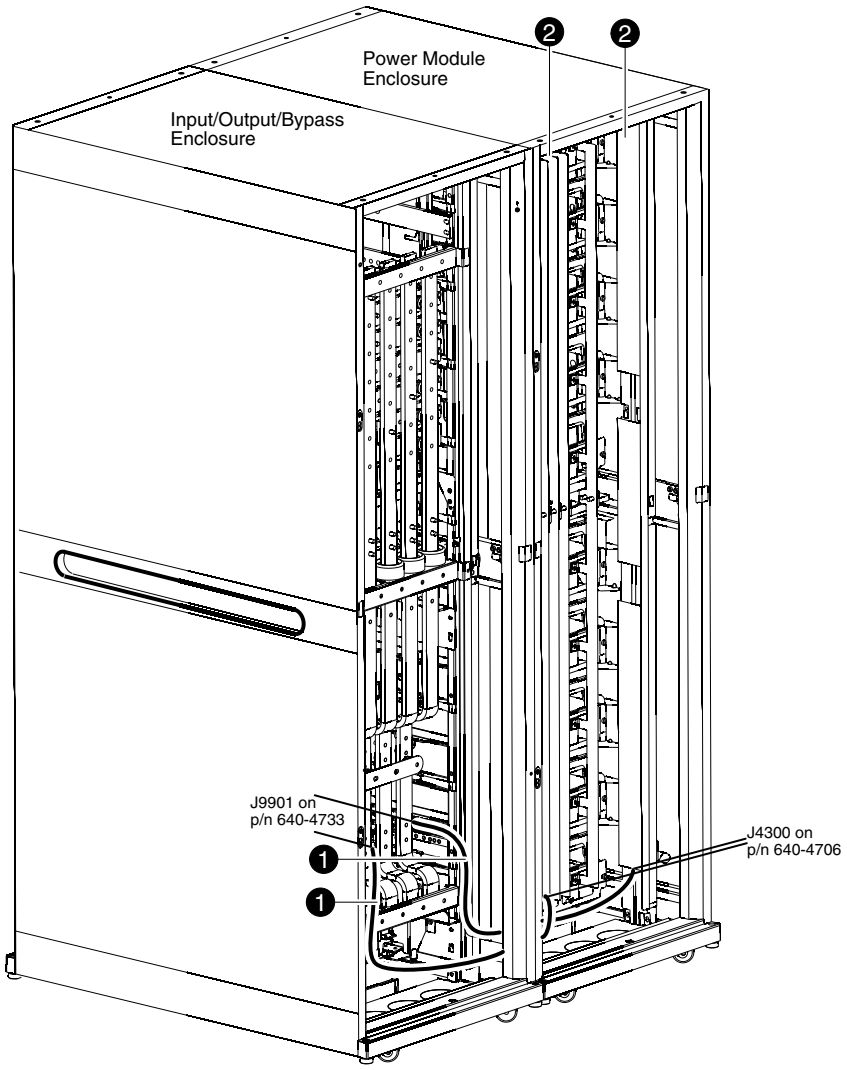
Installations in Canada

- CL2 RCertified, type ELC (Extra-Low-Voltage Control Cable)
- CL2 XCertified, type ELC (Extra-Low-Voltage Control Cable)

For installations in Europe

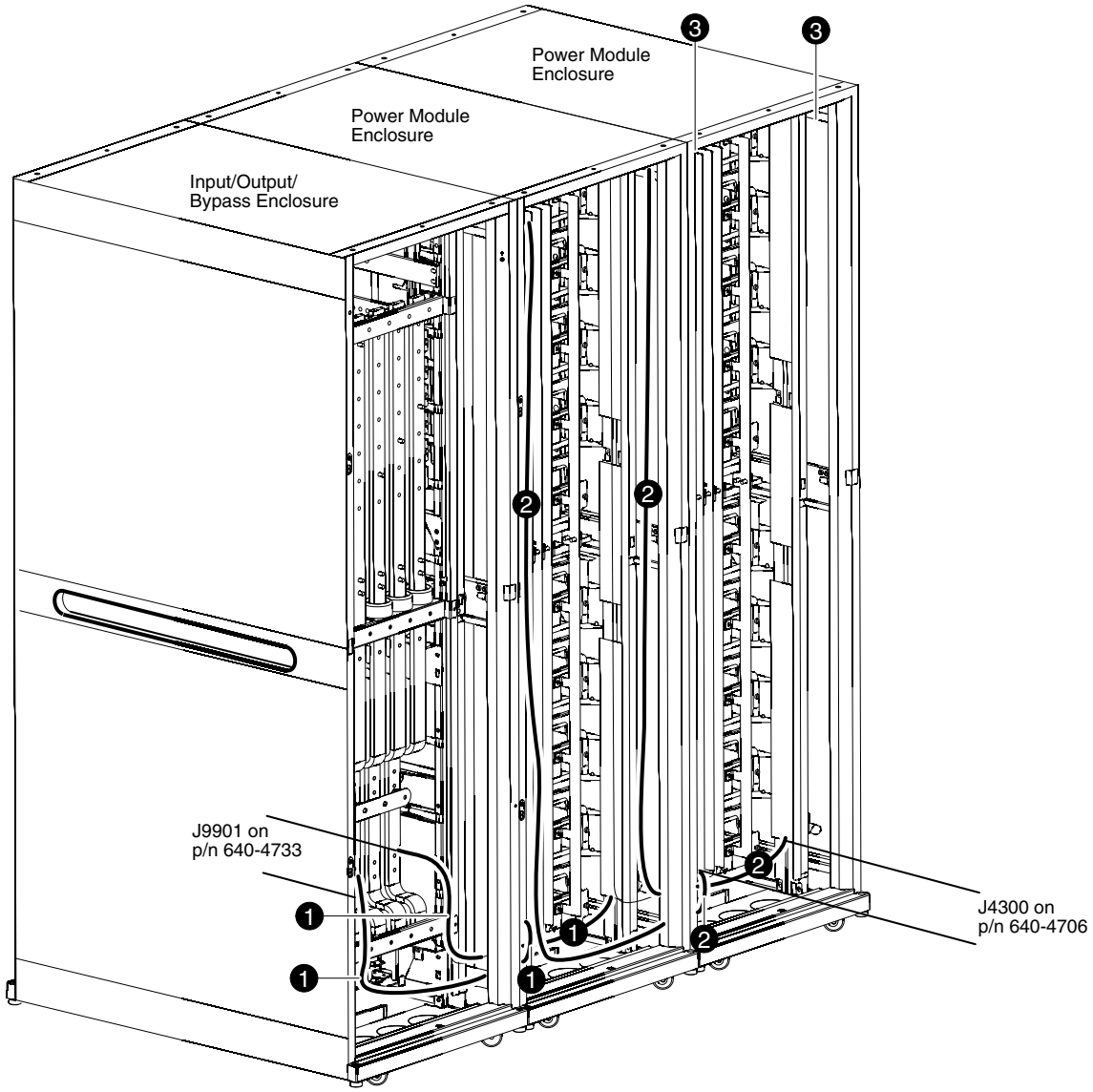
The EPO can be achieved with either a contact closure or application of an external 24 Vac or 24 Vdc from a SELV (Safety Extra Low voltage). It is important to note that the hazardous voltage from the mains voltage must be isolated from the contact closure or 24 Vac/24 Vdc circuit. The EPO circuit contact closure, the Vac or Vdc circuit is considered a SELV circuit as defined in EN60950 “Safety of Information Technology Equipment”.

Connect Communication Cables between Power Module and Input/Output/Bypass Enclosure in 250 kW systems



1. Take the MIM/RIM cables that are placed in the bottom of the Power Module Enclosure and connect them in the bottom of the Input/Output/Bypass Enclosure (left to left and right to right).
2. Verify that terminators are installed.

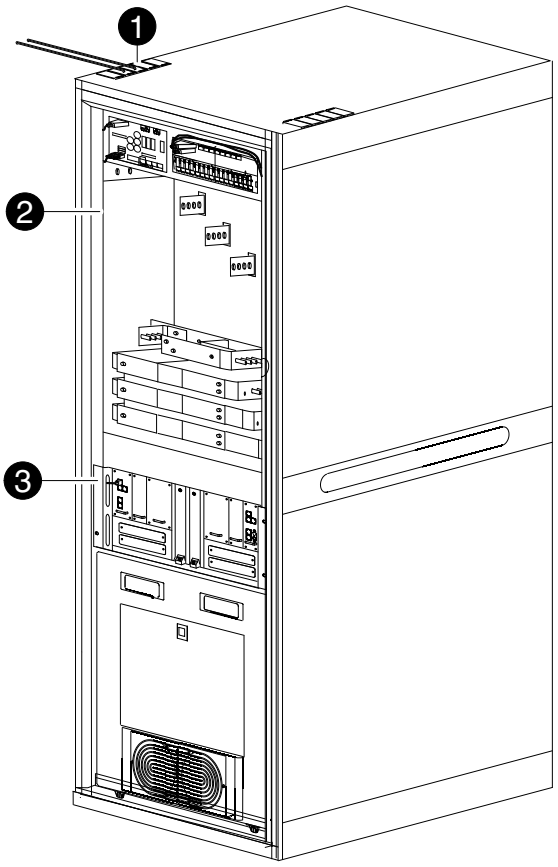
Connect Communication Cables between Power Module and Input/Output/Bypass Enclosures in 500 kW Systems



1. Take the MIM/RIM cables that are placed in the bottom of Power Module Enclosure next to the Input/Output/Bypass Enclosure and connect them in the bottom of the the Input/Output/Bypass Enclosure (left to left and right to right).
2. Take the MIM/RIM cables that are placed in the bottom of the other Power Module Enclosure. Connect one end in the top of this Power Module Enclosure and the other end in the bottom of the second Power Module Enclosure (left to left and right to right).
3. Verify that terminators are installed.

Run the Communication Cables

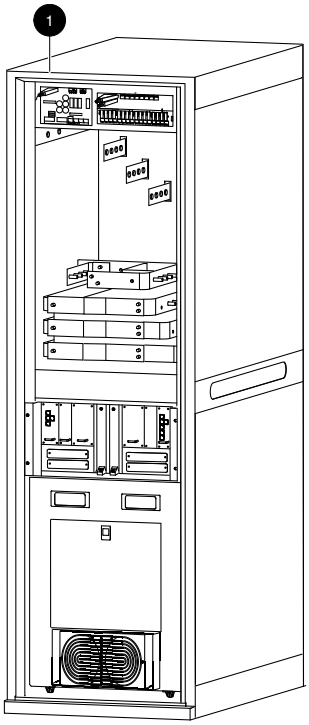
1. Run the cables through the openings in the top cover.
2. Guide the cables through the cable channel in the side.
3. Guide the cables through the hole from the cable tray to the board assembly.



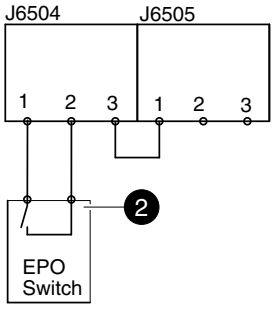
Connect the EPO and Output Disconnect Switch

1. Run the cables through the openings in the front left corner of the enclosure.

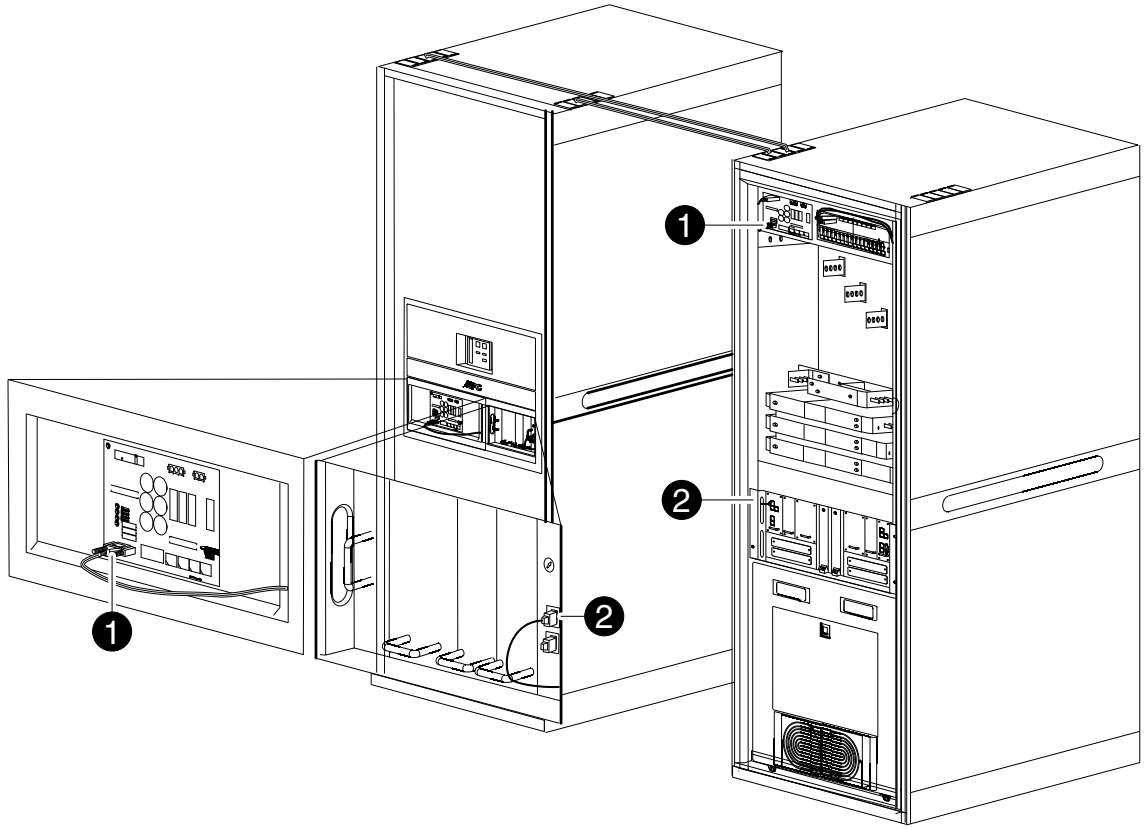
Input/Output/Bypass Enclosure



2. Connect the cable from the EPO to the ECT board. A normally open installation is shown.



Connect Communication Cables between the Input/Output/Bypass Enclosure and Battery Enclosure

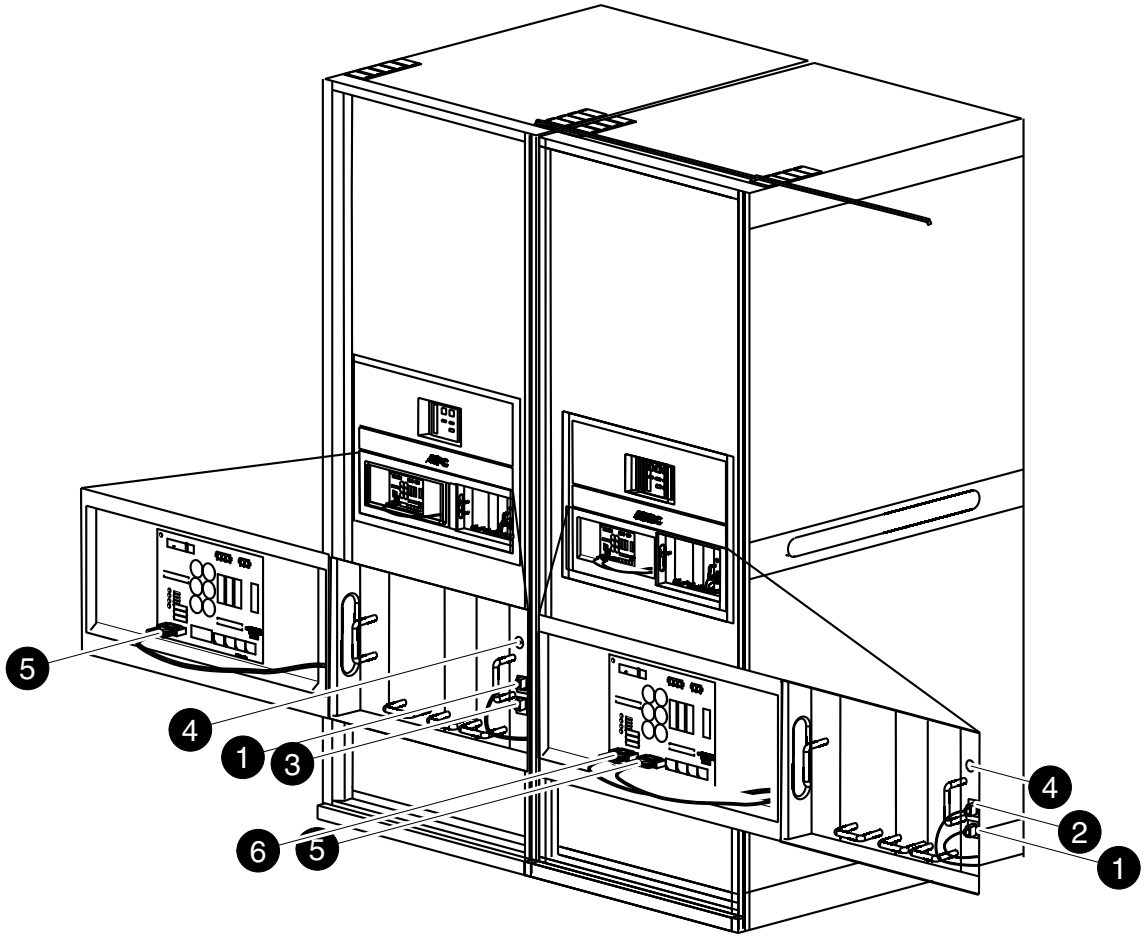


1. Connect the ECT (Emergency Connect and Trip) cable 0W4528 (0W3759 in installations with remote batteries) from the Input/Output/Bypass ECT Board (0P4711) connector J6500 to the Battery Enclosure ECT Board (0P4711) connector J6500.
2. Route Abus cable 0W4527 (0W3758A in installations with remote batteries) from the Abus terminal on the External Connection Board in the Input/Output/Bypass Enclosure to the top Abus terminal on the Abus Communication Board. Route the cable in the right cable channel and remove the two bolts securing the top baying kit while routing the cable. Connect the cable.

Note: Only one A–bus cable (0W3758A) can be used in the installation.

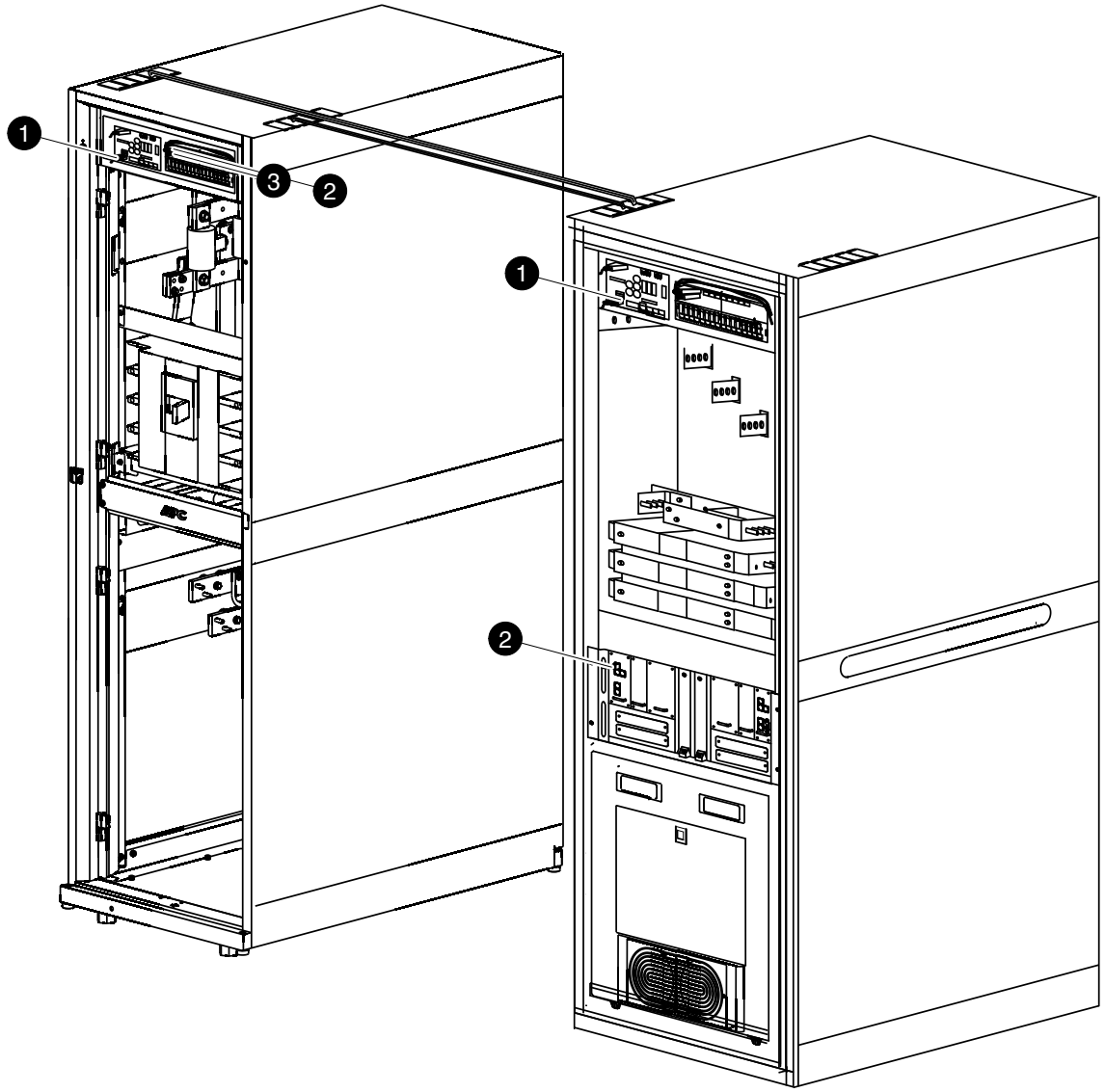
Connect Communication Cables between Battery Enclosures

WARNING: Harzadous electric voltages are present if batteries are installed. Do not stick fingers behind the ECT board.



1. Remove the terminator from the bottom Abus terminal on the Battery Enclosure that is connected to the UPS and connect 0W4527 Abus terminal to the top Abus terminal on the next Battery Enclosure in the system.
2. Route the Abus cables (0W4527) between all Battery Enclosures in the system from the bottom Abus slot to the top Abus slot in the next Battery Enclosure. Route the cable in the right cable channel and remove the two bolts securing the top baying kit while routing the cable. Connect the cable to the slots.
3. Install the terminator in the bottom Abus terminal on the last Battery Enclosure.
4. Set the number of each Battery Enclosure using the selector.
5. Connect the ECT cable (0W4528) from the connector J6501 on the ECT Board of the Battery Enclosure connected to the Input/Output/Bypass Enclosure to connector J6500 on the next Battery Enclosure in the system.
6. Connect ECT cables (0W4528) between all Battery Enclosures in the system as in step 5.

Connect Communication Cables between Input/Output/Bypass and Battery Breaker Enclosure



1. Connect ECT cable (0W3759) from the Input/Output/Bypass ECT Board (0P4711) connector J6500 to the Battery Breaker Enclosure ECT Board (0P4711) connector J6500. In the Battery Breaker Enclosure, secure the ECT cable (0W3759) to the cable relief in the lower left corner.
2. Connect the Abus cable (0W3758A) from the Abus terminal on the External Connection Board in the Input/Output/Bypass Enclosure to the top Abus terminal J2 on the Ancillary Monitor Board. In the Battery Breaker Enclosure, secure the Abus cable (0W3758A) to the cable relief in the upper right corner.
3. Verify that terminator 0W03913 is installed in the J4 terminal on the Ancillary Monitor Board in the Battery Breaker Enclosure.

Relay Inputs/Outputs

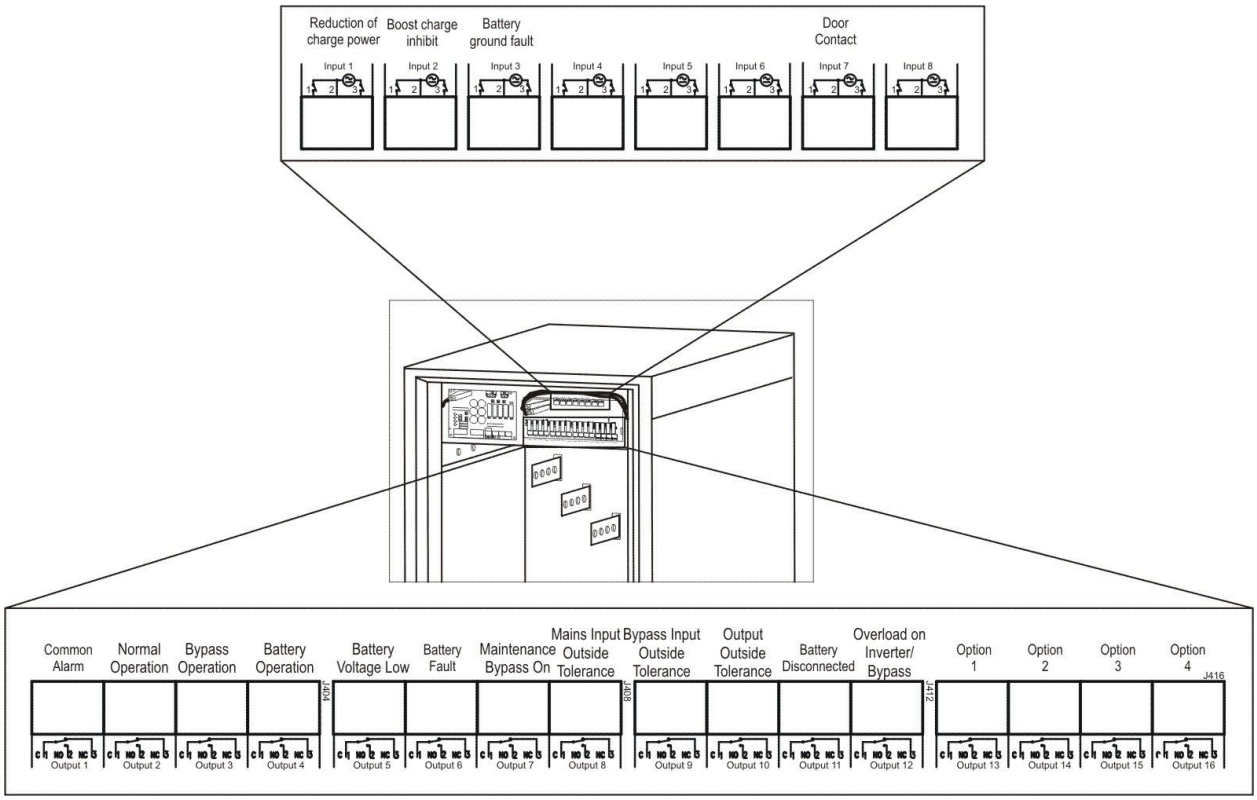
The relay board informs the user of the operation mode, status, and alarm conditions and has eight ports on the input side and 16 output terminals.

All input voltages must have the same ground and 0 V reference.

All wiring to the relay board should be considered as field wiring rated minimum 480 Vac, and must use copper conductors only.

Note: Communication cables to the relay board should be run through the openings in the front right corner of the enclosure.

Note: Option 1 to 4 can be configured via the display.



Installation of Breaker Adapters and Circuit Breakers

WARNING: The system must be completely shut down when breaker adaptors and circuit breakers are added.

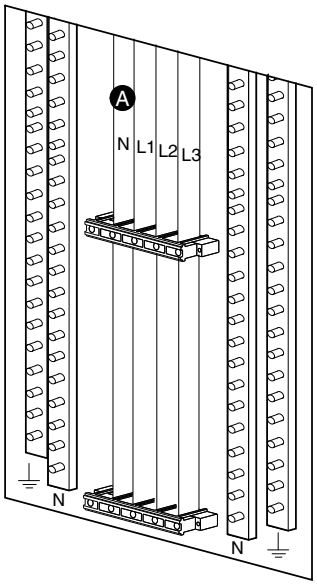
The Distribution Panel

The distribution panel is located in the Maintenance Bypass with Distribution (MBwD) of the Symmetra PX 250/500 kW system.

As standard the distribution panel is equipped with three phases (L1-L3) for 3-pole breakers. For use with 4-pole breakers in countries where isolation of the neutral is required, a neutral bar must be installed by APC to supply breakers with neutral.

The distribution panel's flexibility enables different frame sizes to be populated in the same panel.

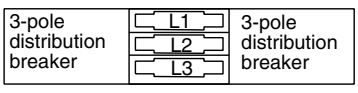
A. Optional neutral bar.



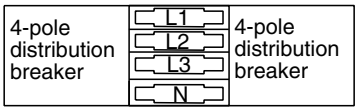
The Breaker Adaptors

The circuit breakers connect to the panels by means of a breaker adaptor, and they are available in three frame sizes: T1, T3, and T5. The breaker adaptors have terminals to attach two circuit breakers, and contacts in the rear that connect to the output rails.

The 3-pole breaker adaptor terminals are designated L1, L2, L3 from the top to the bottom.



The 4-pole breaker adaptor terminals are designated L1, L2, L3, N from the top to the bottom.



The below table outlines the number of possible breaker adaptors that can be inserted in the distribution panel:

Breaker frame size	Max. number of 3-pole devices	Max. number of 4-pole devices
T1	16	12
T3	12	8
T5	8	

Install the Breaker Adaptors and Circuit Breakers in the MBwD

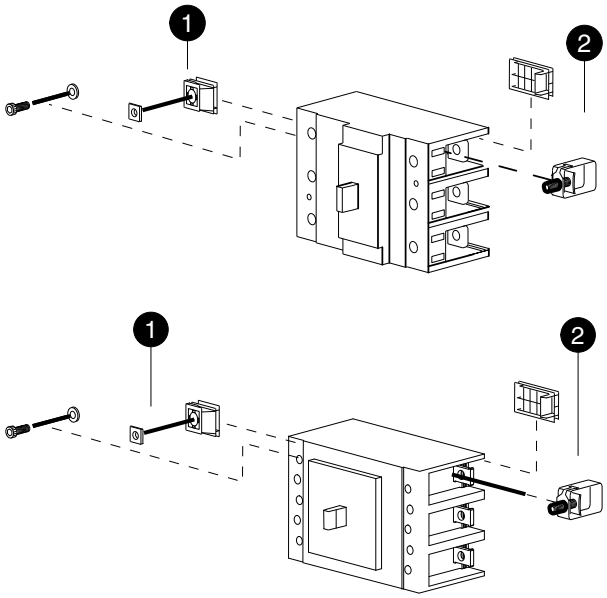
Note: All parts needed for the installation procedures are included with the circuit breaker kit.

Note: A breaker schedule should be maintained and kept in the breaker schedule on the front of the inner door.

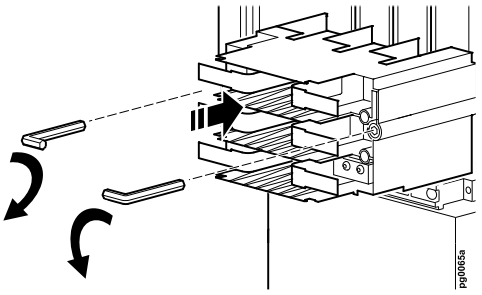
Both the input and output sides of the T3 and T5 breakers require preparation before they are installed on the panel. Follow the instructions below for each pole.

Steps 3–9 below show the installation of the T1 3-pole breaker assembly. The steps are identical for the other breaker assemblies.

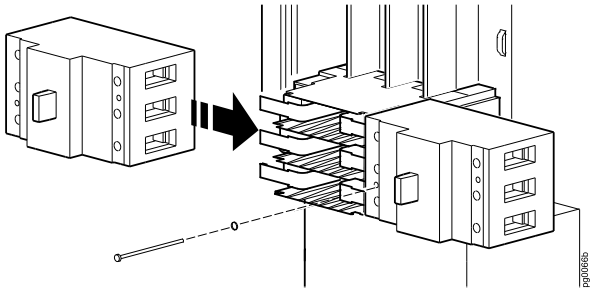
1. On the input side, place an M8 square nut into a square nut retainer, and insert the nut retainer into the pole position. Slide an M8 washer onto an M8 bolt and insert the bolt into the pole position by loosely attaching the bolt to the M8 square nut.
2. On the output side, slide a saddle lug into the pole position. You may need to loosen the bolt in the lug. Insert a saddle lug retainer into the pole position.



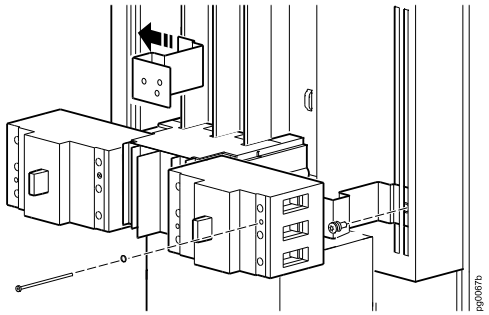
3. Attach the breaker adaptor to the distribution panel, and secure it by turning the module locks using and allen key.



4. Snap the circuit breakers onto the adapter module's bus, and lock in place with an M4 x 70 screw. Use a Phillips screwdriver to tighten.



5. Attach the breaker brackets to the slots in the distribution panel, and secure using an M6 x 12 Torx screw. Use a T25 Torx driver to tighten.
6. Attach the breaker to the breaker bracket using an M4 x 70 screw. Use a Phillips screwdriver to tighten.
7. When the panel is fully configured, cut the plastic rail covers provided with the distribution panel to appropriate length to cover the live busbar rails.
8. Install terminal covers (supplied) over the terminals that are not used.

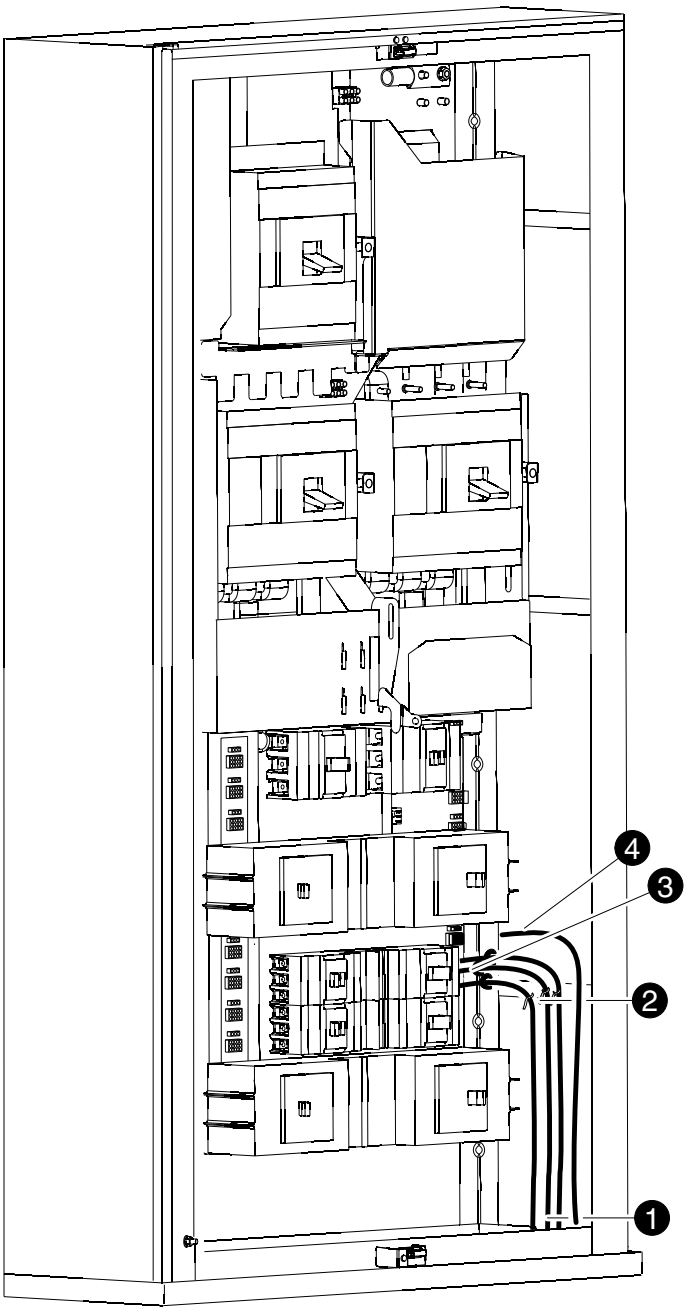


WARNING: No terminals or live parts must be left exposed.

Connect the Load to the Distribution Panel

1. Route the cables through either the top or the bottom of the MBwD to the distribution breakers.
2. Secure the cables to the brackets in the right or left panel.
3. Connect the cables to the breakers according to the distribution breaker documentation.
4. Connect neutral (if applicable) and ground/PE conductor. Attach the connectors provided to the Neutral and PE busbars located at both sides of the distribution panel. Place sleeves over the conductors, insert conductors with sleeves into the connectors, and apply the appropriate torque.

MBwD



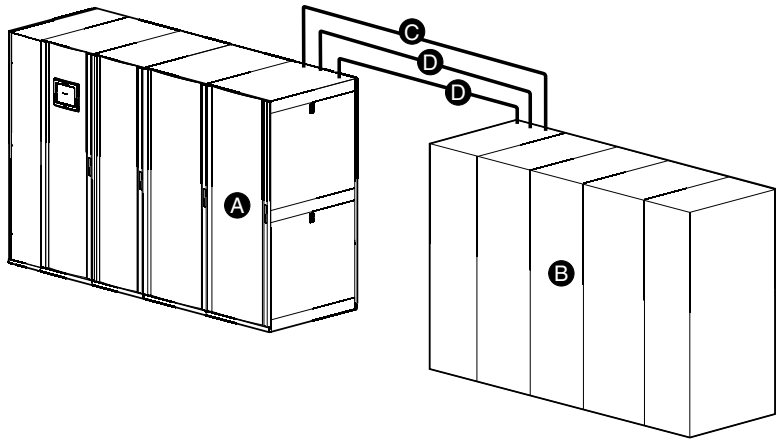
Installation of the Battery Breaker Enclosure (Option)

The Battery Breaker Enclosure (BBE) can be installed up against the Power Module Enclosure or remotely.

BBE placed Line-up-and-match

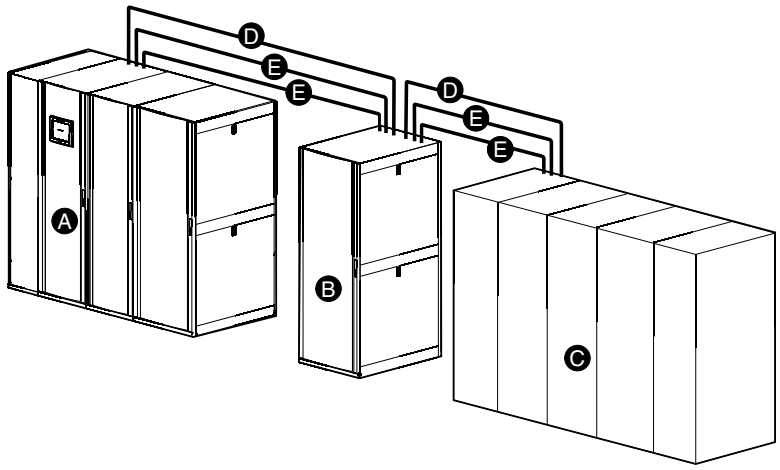
Note: In systems with a line-up-and-match BBE, the BBE is grounded via the baying kit.

Note: In systems with a line-up-and-match BBE, the DC output is hardwired by APC via busbars between the Battery Breaker Enclosure and the Power Module Enclosure.



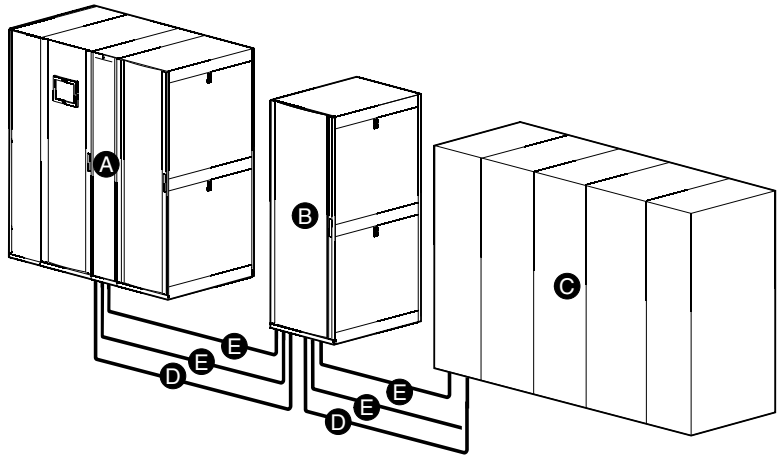
A. Battery Breaker Enclosure
B. Battery Bank
C. Ground/PE cable
D. Battery cables

BBE placed Remotely in Top Cable Entry Systems



A. Input/Output/Bypass Enclosure
B. Battery Breaker Enclosure
C. Battery Bank
D. Ground/PE cable
E. Battery cables

BBE placed Remotely in Bottom Cable Entry Systems



A. Bottom Feed Enclosure
B. Battery Breaker Enclosure
C. Battery Bank
D. Ground/PE cable
E. Battery cables

Prepare BBE for Cables in Top Cable Entry Systems

1. From the inside of the BBE, loosen the four screws.
2. Lift up the front of the top cover and slide out the cover.
3. Drill/punch holes for the cables.
4. Refit the cover and install conduits (if applicable). Ensure no sharp edges that may damage the conductors.
5. Run the cables through the top of the BBE to the cable landing area.

Prepare BBE for Cables in Bottom Cable Entry Systems

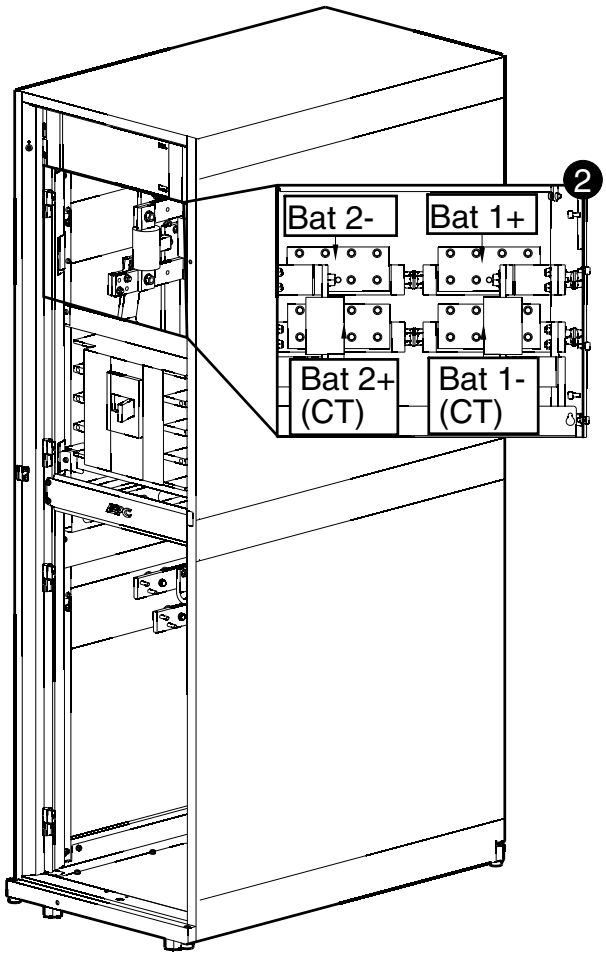
1. From the inside of the BBE, loosen the 4 screws of the rear bottom cover and remove.
2. Drill/punch holes for cables.
3. Refit cover and install conduits (if applicable).
4. Ensure no sharp edges that may damage conductors.

Connect Cables in Systems with Line-Up-and-Match BBE

The battery breaker supports two strings of 144 VLA batteries (equal 2 x 288 V). The two strings are divided into a positive (+) and a negative (-) string. For runtime optimization, the number of cells can be adjusted to +/- 6 cells (138-150 cells).

1. Route the DC input cables from the battery bank and through the top or bottom of the BBE and guide them to the DC input terminals in the top of the enclosure.
2. Connect the DC input cables to the Bat 1 and Bat 2 busbars.

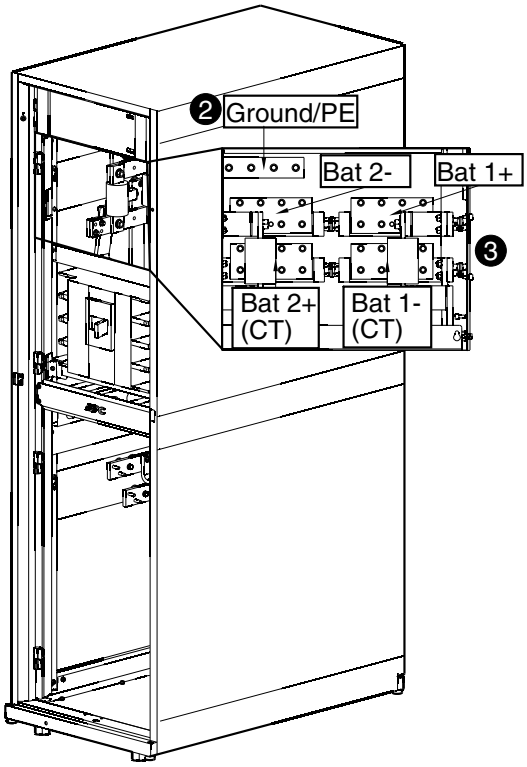
Battery Breaker Enclosure



Connect Cables in Systems with Remote BBE

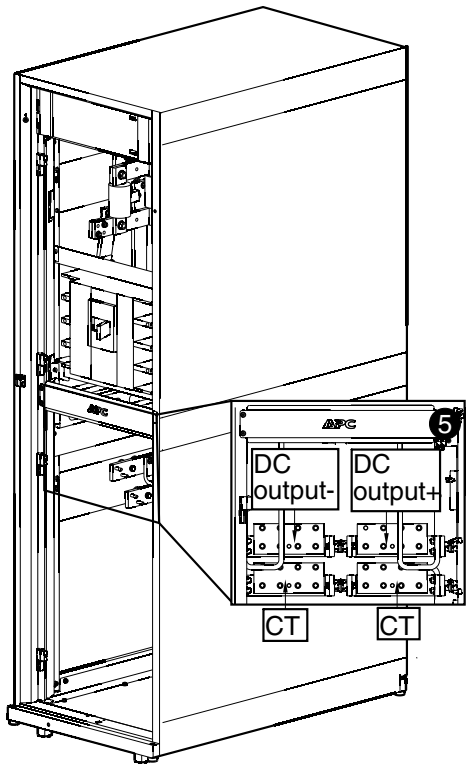
1. Route the DC input cables from the battery bank and through the top or bottom of the BBE and guide them to the DC input terminals in the top of the enclosure.
2. Connect the ground/PE cable to the equipment grounding terminal in the upper left corner of the enclosure.
3. Connect the DC input cables to the Bat 1 and Bat 2 busbars.

Battery Breaker Enclosure

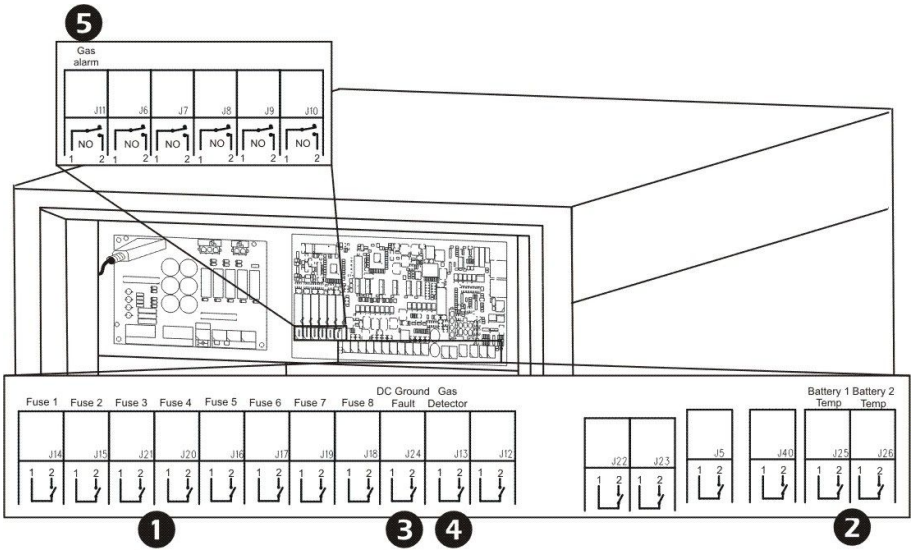


4. Route the DC output cables from the UPS and through the top or bottom of the BBE and guide them to the DC output terminals in the bottom of the enclosure.
5. Connect the DC output cables to the DC output busbars.

Battery Breaker Enclosure



Connect BBE Communication Cables

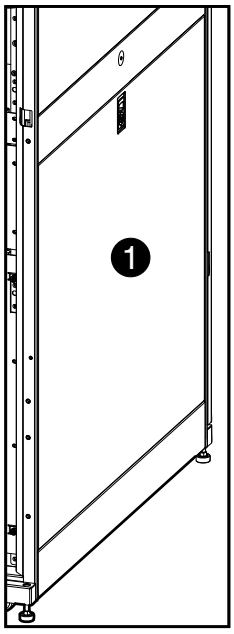


1. Connect cables from fuse indicators from the fuses in the battery bank to J14-J21. If not used, jump the inputs as they are configured as normally closed (NC).
2. Install the battery temperature sensors in the battery bank as described in the documentation supplied with the battery temperature sensors, and connect cables from the battery temperature sensors to J25 and J26.
3. Connect cable from the DC ground fault detection to the J24. If not used, jump the inputs as they are configured as normally closed (NC).
4. Connect cables from the gas detector to J13. If not used, jump the inputs as they are configured as normally closed (NC).
5. Connect cable from gas alarm relay to J11.

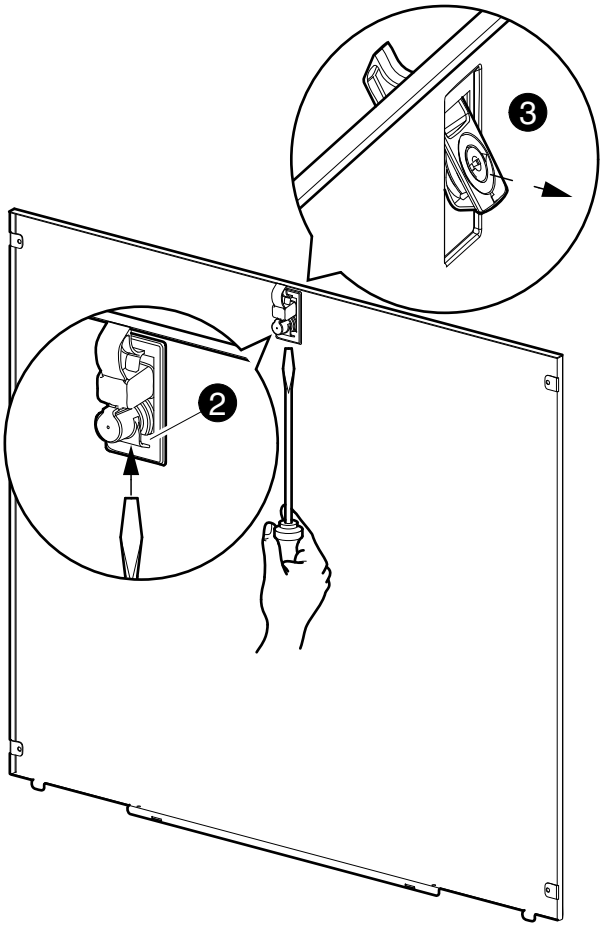
Install Seismic Option

Replace the Side Panel Lock

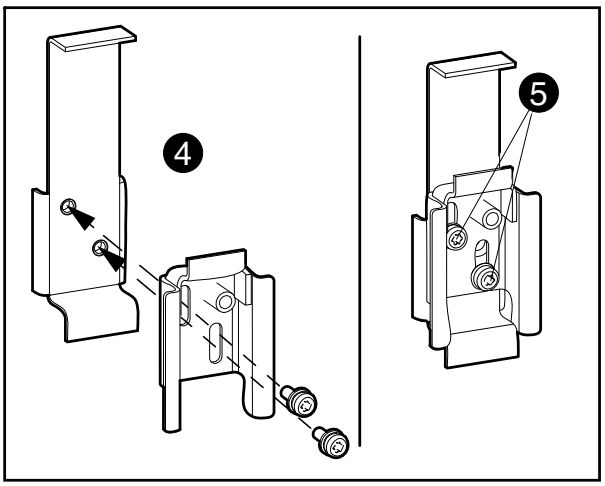
1. Remove the side panel from the end of row enclosures.



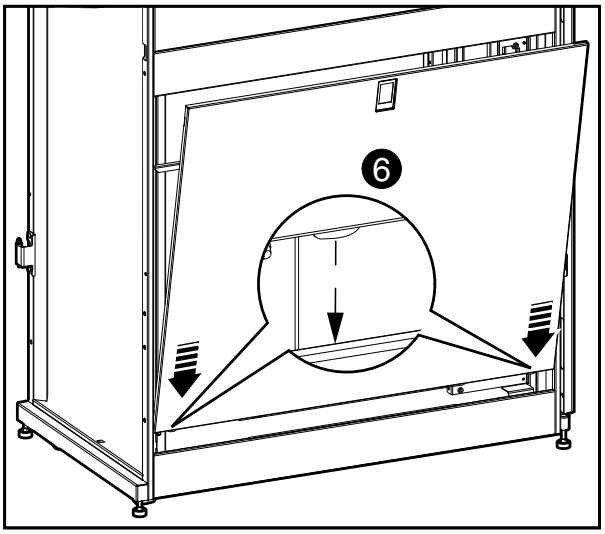
2. Use a screwdriver to press on the tap that secures the lock to the side panel.
3. Pull the lock out and up and remove it from the side panel.



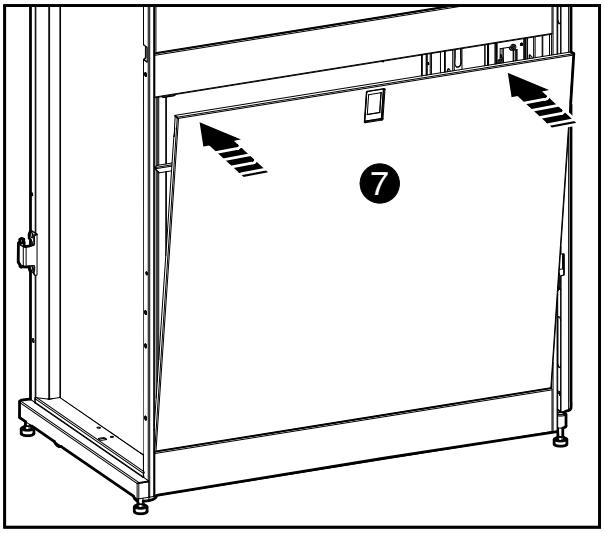
4. Put the two lock parts together.
5. Loosely tighten the screws.



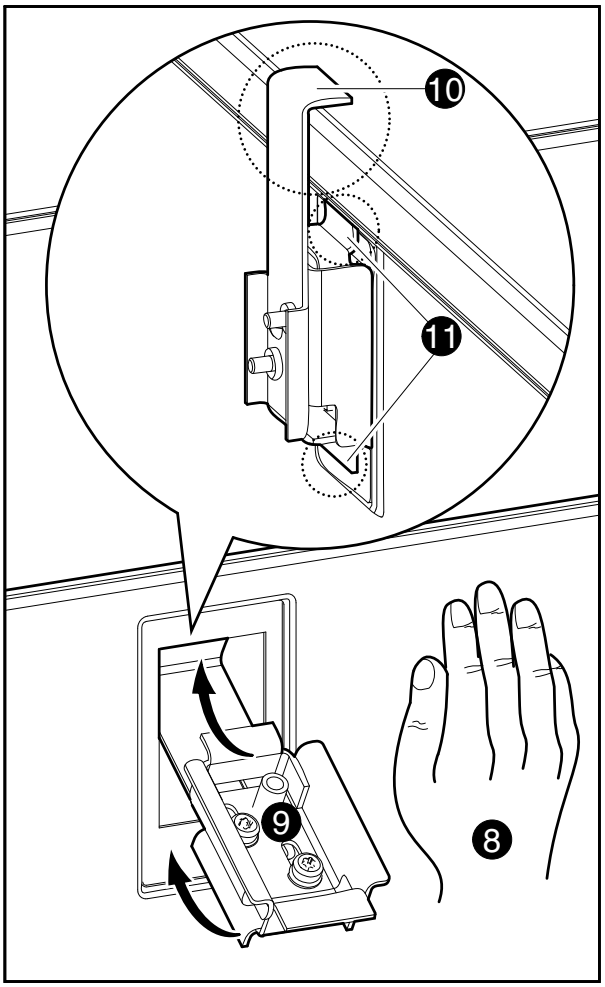
6. Place the side panel at an angle at the bottom of the frame.



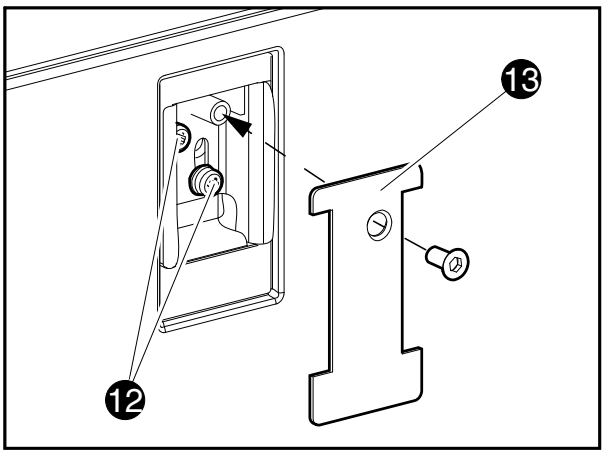
7. Push the top of the side panel in place.



8. Hold the side panel with one hand.
9. Take the lock assembly and guide the top through the hole in the side panel.
10. Lift the lock assembly in place.
11. Ensure that the upper and lower taps are hidden behind the side panel.

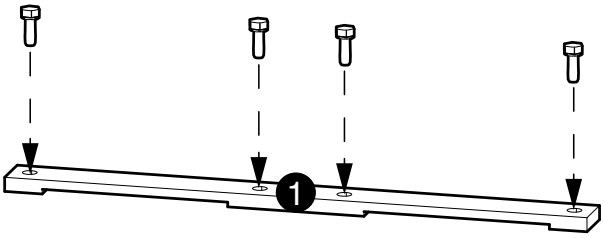


12. Secure the two screws in the lock assembly.
13. Install the lock cover using the provided screw.

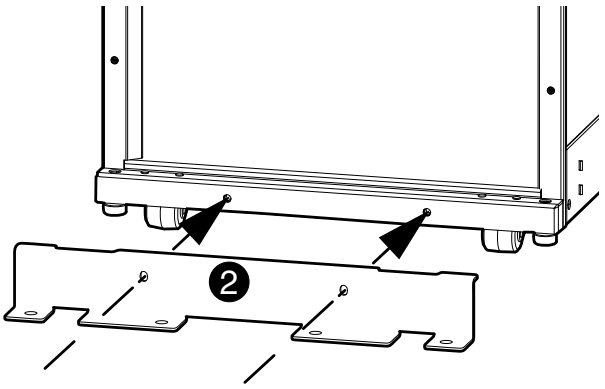


Install the Rear Anchoring Brackets

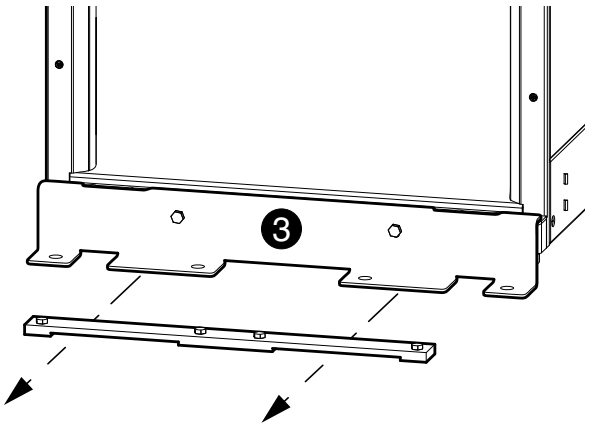
1. Secure the floor anchoring bracket to the floor using floor anchoring bolts (not supplied). Use M12 strength class 8.8 or 1/2 in grade 5 steel bolts.

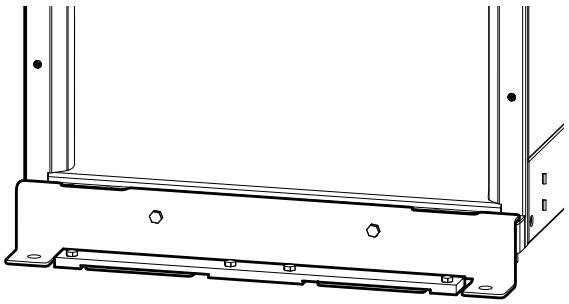


2. Secure the other part of the rear anchoring to the back of the enclosure.



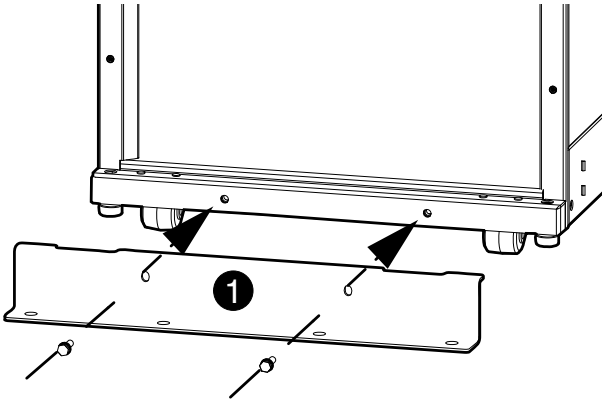
3. Push the enclosure backwards so the enclosure slides under the floor anchoring bracket.



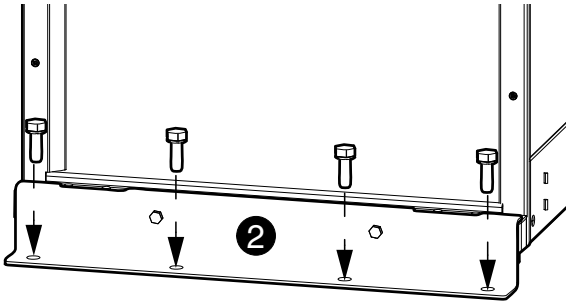


Install the Front Anchoring Bracket

1. Secure the front anchoring bracket to the enclosure.



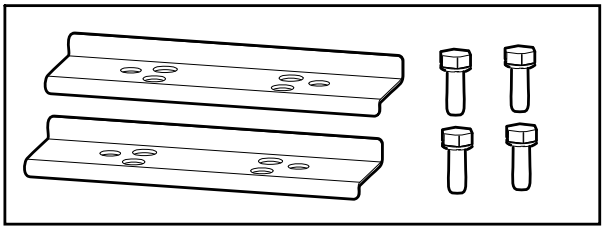
2. Secure the front anchoring bracket to the floor using floor anchoring bolts (not supplied). Use M12 strength class 8.8 or 1/2 in grade 5 steel bolts.



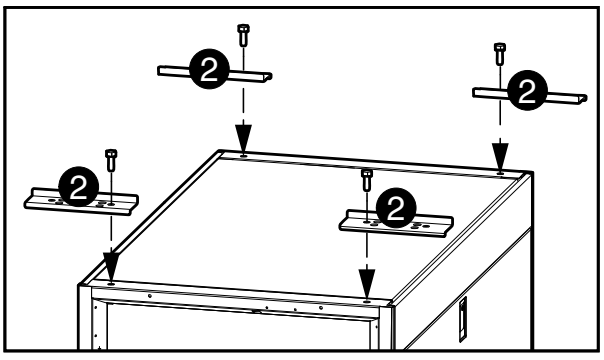
Install the Top Assembly Bracket

Required parts for each assembly:

- Two top assembly brackets
- Four screws



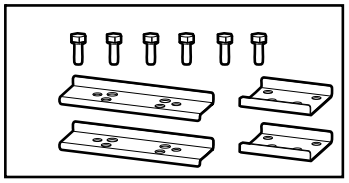
1. Only applicable for Symmetra PX 100 kW systems: Dispose of the top assembly brackets supplied with the battery enclosure.
2. Place the top assembly bracket over two adjacent enclosures and secure using two screws.



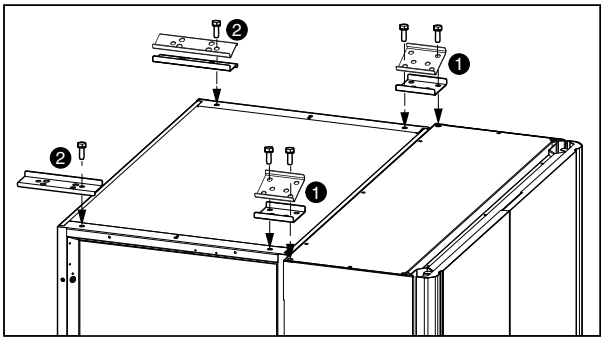
Install the Assembly Bracket between Input/Output/Bypass and MBwD

Required parts:

- Four top assembly brackets
- Six screws



1. Place the two narrow top assembly brackets over the corners of the Input/Output/Bypass enclosures and secure using the provided four screws.
2. Place the two wide top assembly brackets over the Input/Output/Bypass enclosure and the adjacent Power Module enclosure and secure using the provided two screws.

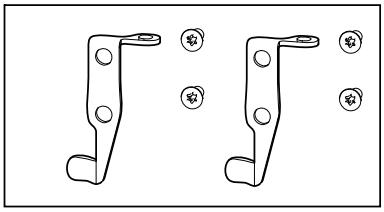


Install the Door Hinge Lock

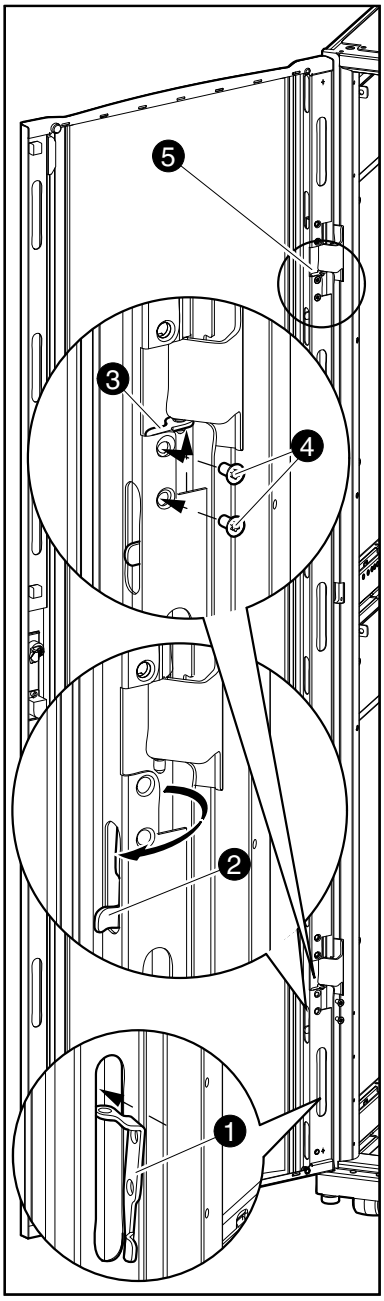
Note: This procedure is only applicable for 600 mm and 750 mm wide enclosures.

Required parts:

- Two door hinge locks
- Four screws



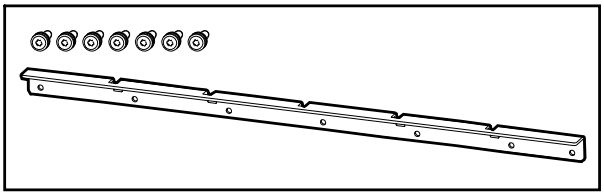
1. With one hand slide the lock into the hole below the hinge.
2. With the other hand turn the lock 90° holding the bottom of the lock.
3. Push the lock upwards to the bottom of the hinge.
4. Secure it with the two provided screws.
5. Use the same procedure to install the upper door hinge lock.



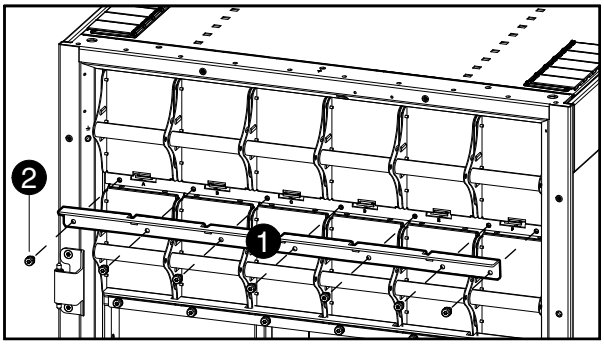
Install the Battery Locks

Required parts:

- Eight battery locks
- 56 screws



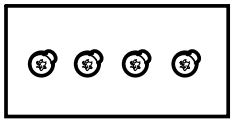
1. Place the battery lock below the battery row.
2. Secure the lock by the seven provided screws.



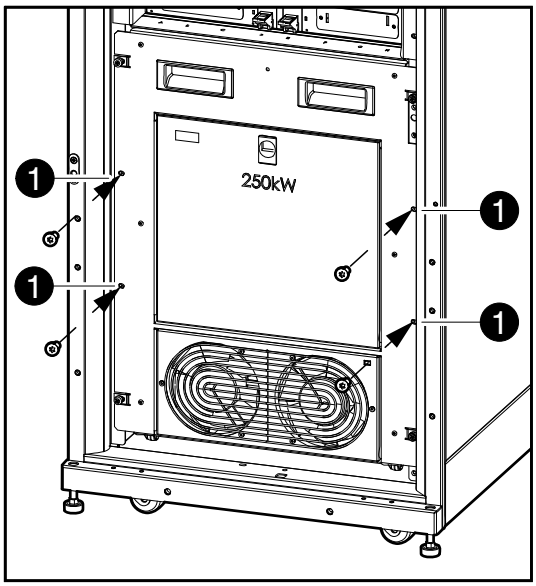
Install the Bypass Static Switch Lock

Required parts:

- Four M5 bolts



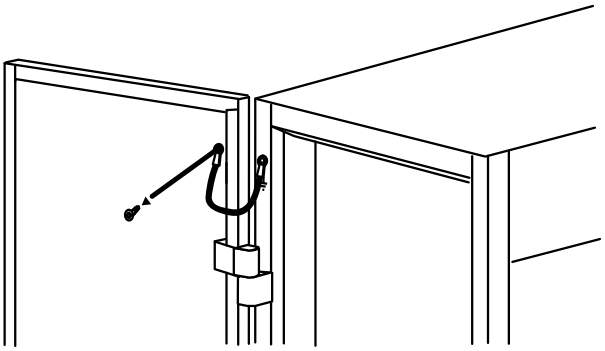
1. Secure the bypass static switch using the four provided bolts.



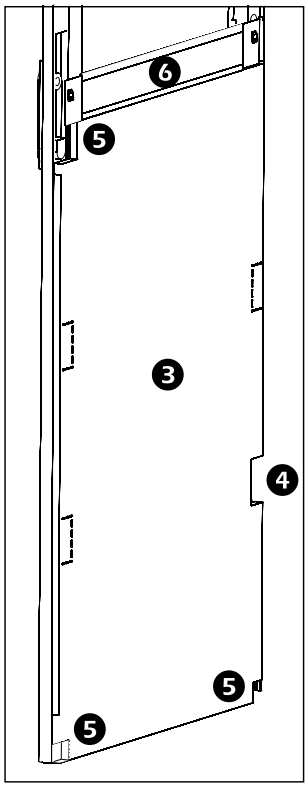
Install the Filter Option in the Power Module Enclosure

The filters are used for extra protection of systems installed in environment with conductive dust. Check the filters once a month. If the air filters show visible dust or other impurities, the filters must be replaced.

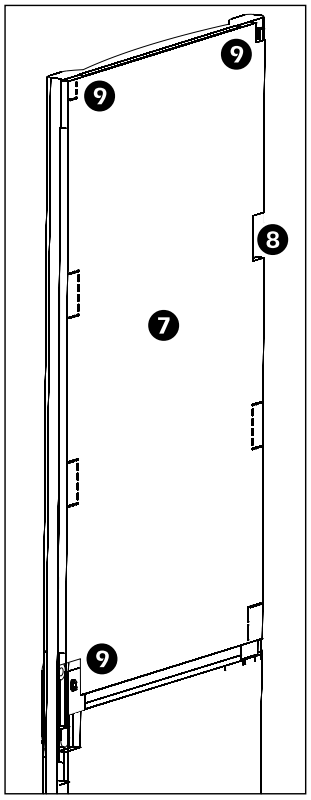
1. Open the front door.
2. Loosen the screws and disconnect the ground wire between the front door and the Power Module Enclosure.



3. Press the bottom filter plate against the bottom half of the front door.
4. Remove the bottom right perforated area of the filter to get access to the bottom hinge.
5. Remove the three perforated corners marked in the drawing.
6. Install the logo plate.



7. Press the top filter plate against the top half of the front door.
8. Remove the top right perforated area of the filter to get access to the top hinge.
9. Remove the three perforated corners marked on the drawing.
10. Reconnect the ground wire disconnected in step 1.



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990–2746G-001 08/2011